PACIFIC DISCOVERY

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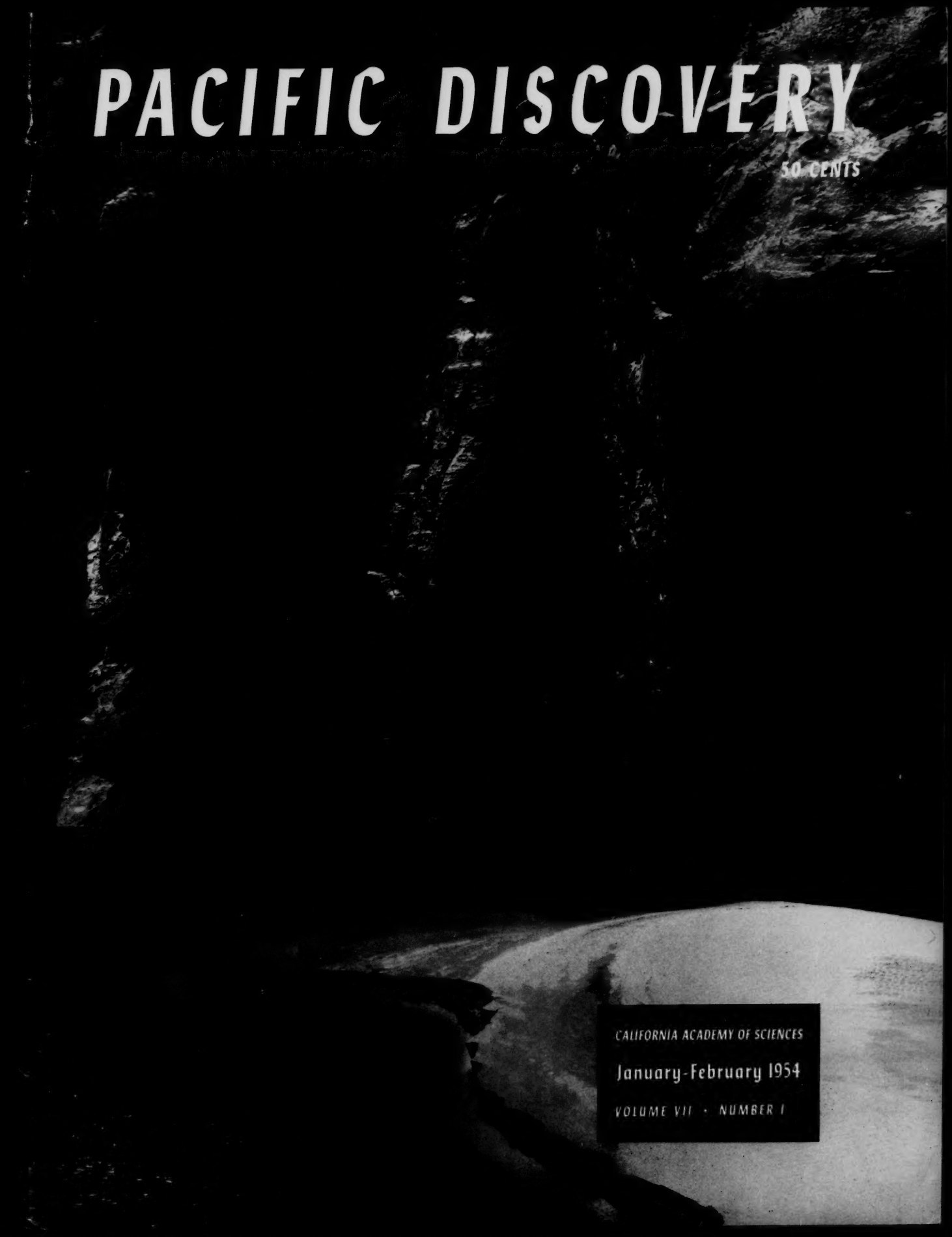

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January-February 1954

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A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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PRE-DISCOVERY

"TROUBLE IN DINOSAUR" is the theme of the February *Sierra Club Bulletin* which our printer has rushed through the presses ahead of schedule in extra quantity. Dinosaur? Our author, Professor Harold C. Bradley, spoke recently at a Bay Area service club meeting. "What are you talking about, Professor?" one of the well-groomed, clean-cut young business men asked before the luncheon. "Dinosaur," replied Professor Bradley. "Oh!" the Y.B.M. rejoined. "They've been extinct for millions of years, haven't they?" . . . When conservation groups all over the country were alerted very recently to the suddenly immediate danger to Dinosaur National Monument, they quickly realized that the most urgent need was public education. Most Americans simply don't know the place exists, let alone what its unique esthetic and recreational values are. If any government agency or private corporation were to put forth a serious proposal to dam Yosemite Valley for a reservoir and power project, the idea would be buried under an avalanche of public reaction at the first peep. Such agencies and interests know better than to push for anything which would destroy a national park or monument *that is well known* – yet. As for Dinosaur – *"The threat is real and immediate,"* the *SC Bulletin* warns. "The enemy of conservation, in Dinosaur, is primarily lack of vision and an absence of appreciation of intangible values. Local people have so thoroughly convinced themselves that Echo Park dam is essential that great political pressure has been built up. Legislation calling for the dam was introduced last year; hearings started in the House January 18, to continue through the week of the 25th. Every effort is being made to rush the bills through before opposition to Echo Park dam builds up. *Conservation organizations all over the country are aroused* and are acting in unison. Strong editorial support, cutting across party lines, has come from most parts of the country in response to an alerting call that came inevitably late. [Look for Dinosaur stories in *Harper's, National Geographic, The Reporter, Sunset,* and for a book that is being rushed to completion by a big New York publisher.] President Eisenhower has stated that it is his intention to protect 'national forests, parks, monuments, and other natural and historic sites.'" What can *you* do, if you do not want Dinosaur, now, and probably other parks and monuments, later, to be destroyed? Write or wire your wishes *immediately* to Congressman William H. Harrison, Chairman, House Subcommittee on Irrigation and Reclamation, *and* to your own Congressman and, of course, to the President. This is a case where public opinion, sounded in time and in sufficient volume, *can* turn the tide. It has done so before.

DISCOVERING PD'S AUTHORS

Dr. Harold C. Bradley, who wrote for *PD* four years ago on Yosemite's Tioga road, is a Director of the Sierra Club. He recently showed his Dinosaur film to members and friends of the Academy at a monthly meeting. . . . ¶**Dr. Lloyd Glenn Ingles,** Professor of Zoölogy and Head of the Division of Life Sciences, Fresno State College, has a new book in press, *Mammals of California and its Coastal Waters.* . . . ¶Our frequent contributor, **M. Woodbridge ("Woody") Williams,** marine biologist and photographer of Inverness, California, had some of his color work in the recent *Life* special feature on life in the sea. . . . ¶**Dr. Clement W. Meighan** is Instructor in Anthropology at the Los Angeles campus of the University of California. . . . ¶**George W. Bunton** is well known, in person if not in name, to many thousands in the Bay Area as one of the popular lecturers at the Academy's Morrison Planetarium, of which he is manager. He came to us from Griffith Planetarium. D.G.K.

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CANYON walls along the Green River, Dinosaur National Monument. Photograph by Philip Hyde.

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EDITORIAL

What Does Conservation Mean Today?

IN THE PAST HALF-CENTURY the term "conservation" has come to connote something morally and economically beneficial to society. Theodore Roosevelt gave meaning to the word when he used it as a synonym for "wise use of natural resources," and Franklin Roosevelt and the New Deal tied the word closely to government plans for orderly, regulated development of resources. Today it is expedient for every politician and administrator to profess a belief in conservation in return for which he is guaranteed a public nod of approval. Everyone knows in a general way that conservation is good. But specifically what does it mean? And – more important – are we practicing it?

Conservation, or wise use of resources, is subject to much variety of interpretation. To one group of conservationists it would seem that a given grove of redwoods might best be used to yield lumber on a sustained basis; to another group, equally ardent, that the grove should be preserved for its natural beauty. Elsewhere a dam is proposed to conserve the water in a river for power and irrigation, but this form of conservation may destroy a salmon fishery or inundate a scenic canyon. Which use is "wise use"? In parts of the national forests deer and cattle compete seriously for forage. There is general agreement that numbers of animals must be regulated to conserve the forage resource, but which class of stock should stand the reduction, the cattle or the deer? Questions of this nature, large and small, are being decided daily, all within the framework of conservation. What ethical and economic standards can we use as a basis for evaluating the long-term social benefits of one form of resource use versus another?

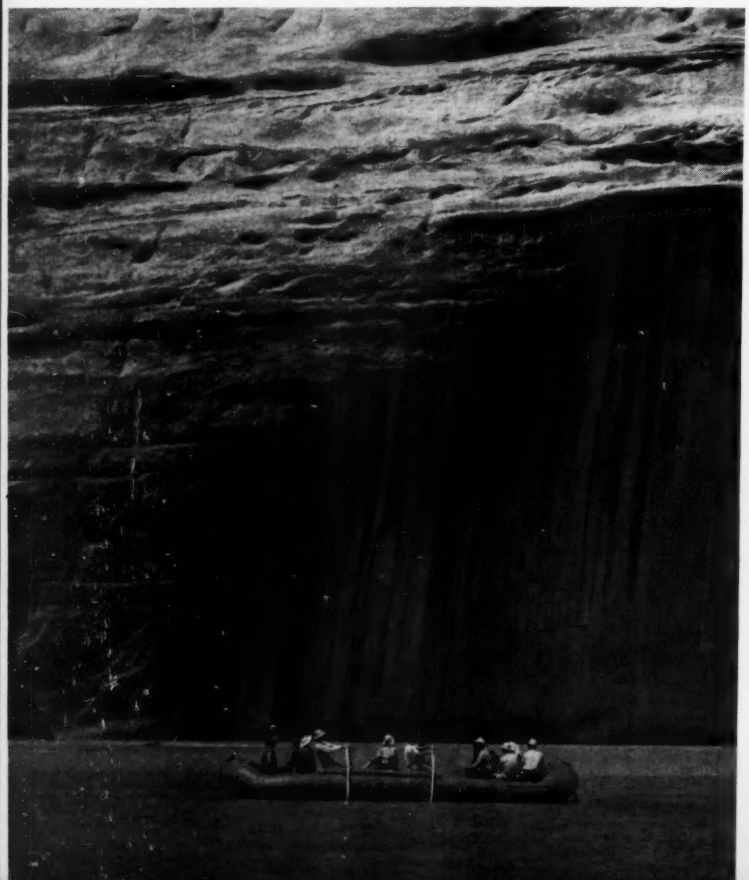
The need for standards becomes evident when one looks back over the conservation record of the past two decades. There is evidence of a sliding scale of values according to current business conditions and economic pressures. In the mid-1930's, for example, when an economic depression happened to coincide with a severe drought, the folly of submarginal farming on arid lands was evident to all. Great social concern was manifested for the farming communities that had grown up, through no fault of their own, in the dust bowl region of the western Great Plains, and a Resettlement Administration was organized to move the unfortunate settlers to more arable lands. The dust bowl was to be replanted to prairie sod for its permanent conservation as grazing land. But in time the rains came again and the price of wheat climbed precipitously as America entered World War II. Plans for restoration of the grasslands were abandoned and a wheat boom engulfed the plains once more. Palliative measures were recommended to reduce erosion, such as contour plowing and planting windbreaks, but the fact remained that a submarginal type of land was still under the plow. The horrors of sifting dust were easily forgotten in the new prosperity. Drought will return, of course, and the cycle will be repeated until perhaps the top soil has all blown away and the western plains become a desert. What of the long-term plans for conservation?

Concurrent with the dust bowl there was a general low in the price of cattle and sheep, and the overgrazed public domain came under the scrutiny of the conservationists. The Taylor Grazing Act was drawn and passed in Congress with the strong support of the public, including the organized stockmen. It provided for an orderly system of controlled livestock grazing on all public lands with a view to conserving the soils and the vegetation for perpetual forage production. But later as the prices of beef, lambs, and wool rose with the price of wheat, the stockmen suddenly discovered that the paternal interest of the Government in conserving the public grazing lands was a financial drag on business in that it severely limited livestock numbers. A pressure block was formed in Congress which repealed the Taylor Act and turned back to local advisory boards of stockmen the right to decide what was conservative stocking and "wise use" of the public ranges. Again, substitute measures of range conservation were adopted, such as brush control and reseeding with grasses, but the public ranges remain grossly overstocked. Flushed with this victory the stockmen attacked the regulatory powers of the Forest Service in an attempt to obtain control of forest grazing policy. The so-called "Stockmen's Grazing Bill" very nearly was adopted in 1953, being defeated only by the militant opposition of various organizations concerned with other forest values that would have suffered under unlimited grazing. The point to be made here is that our collective social judgment as to what constitutes proper use of the land may be guided more by the price of wheat or beef than by consideration for the soil as a resource.

And now some of the national parks and monu-

ments are in danger of being dismembered to make way for power dams and water storage reservoirs. The park system has been built up over the past 80 years, each area being reserved in custody of the Park Service for posterity and the future recreation and enjoyment of all the citizens. But when another conservation agency of the Government, the Bureau of Reclamation, prepares plans for harnessing the western waters they hesitate not one whit to propose inundation of a park under one of their dams. As explained in the accompanying article by Harold Bradley entitled "Danger to Dinosaur," the magnificent Dinosaur National Monument in Utah and Colorado is slated for flooding by a dam recently recommended to the President and to Congress for early construction. One cannot help but wonder which would be adjudged the more valuable 100 years from now, the park or the dam. The demand for public recreation areas is clearly on the rise and there can be no shadow of doubt regarding the future social value of the park. But the dam, which doubtless would create temporary prosperity in its environs, would be filling rapidly with silt 100 years hence. And by then its power output might even be replaced with atomic power, as Secretary McKay has himself publicly stated. In spite of this statement, Mr. McKay now recommends building such a dam in one of our national park units, even though alternative sites exist outside the park. The issue is not whether we should build dams for power and irrigation — some of them indeed are necessary for Western development. Rather it is the roughshod way in which such economic developments disregard other conservation values, like parks, which may be of equal or greater social value.

Typical boating in Dinosaur National Monument. (Martin Litton)

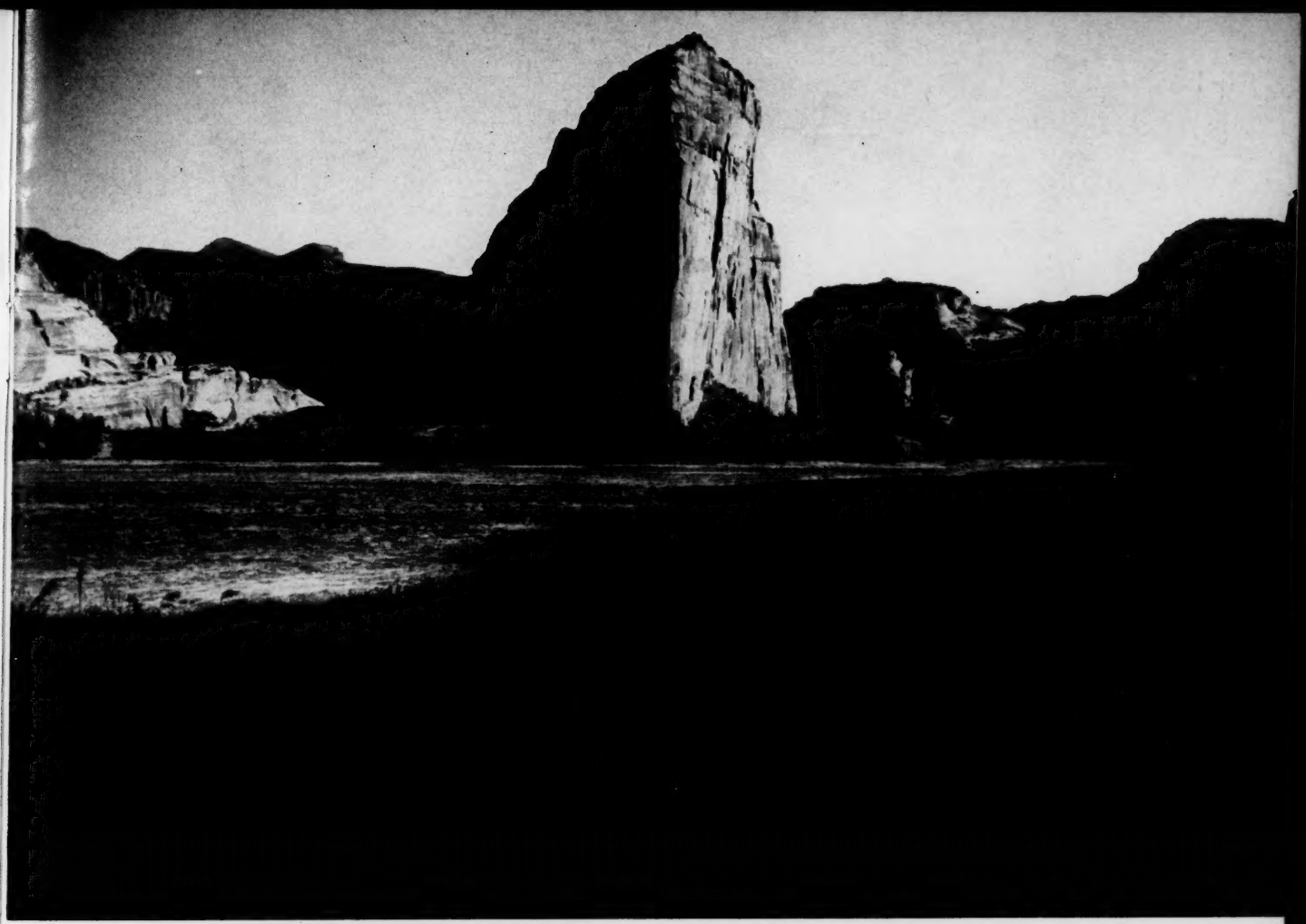


On what grounds will the American people judge these contradictory proposals for conservation of resources? Are we really prepared to recognize and to follow the course of wisest use of our assets, to serve the greatest number of people over the longest period of time? Or are we content to vacillate with political and economic pressures, paying lip-service to conservation without wholeheartedly adopting its precepts?

I fear that as a nation we have not matured to the point of facing resolutely and consistently the long-term problems of resource conservation. We make New Year's resolutions when pressures are low but easily forget them when the opportunity arises to cash in our resources for a ready profit.

No man is so omniscient as to know infallibly what is right and what is wrong in the use of natural resources. But each of us is entitled to an opinion. To me, conservation means making such use of our resources as will obtain from them the maximum social values in the long run. A broad concept of social values must recognize more than mere economic values, although it must be admitted at once that the dominant values of most resources are economic. But in utilizing our soils, forests, waters, and minerals to feed and clothe ourselves, to build our houses and factories, and to feed the hungry maw of industry, we must safeguard the permanence of these sources of wealth while at the same time preserving the intangible assets of a compatible environment.

America is the envy of the world not only because she is productive, vigorous, and wealthy but because she is beautiful. We should be as proud of our parks, our clear rivers, and our well kept farmlands as we are of our cities and factories. In the rush to produce more wheat, more beef, more power, and more manufactured articles we are prone to squander both the sources of our material and our spiritual wealth. The naked stubbles of western Kansas, the miles of worthless weeds on the public ranges of Nevada, the spectre of stagnant mudflats filling the incomparable canyons of Utah bear scant testimony that we are practicing what we preach about wise use of resources. The story of conservation should be written as clearly on the landscape as it is elucidated in the banquet halls. A.S.L.



Steamboat Rock from Echo Park. (Philip Hyde)

HAROLD C. BRADLEY

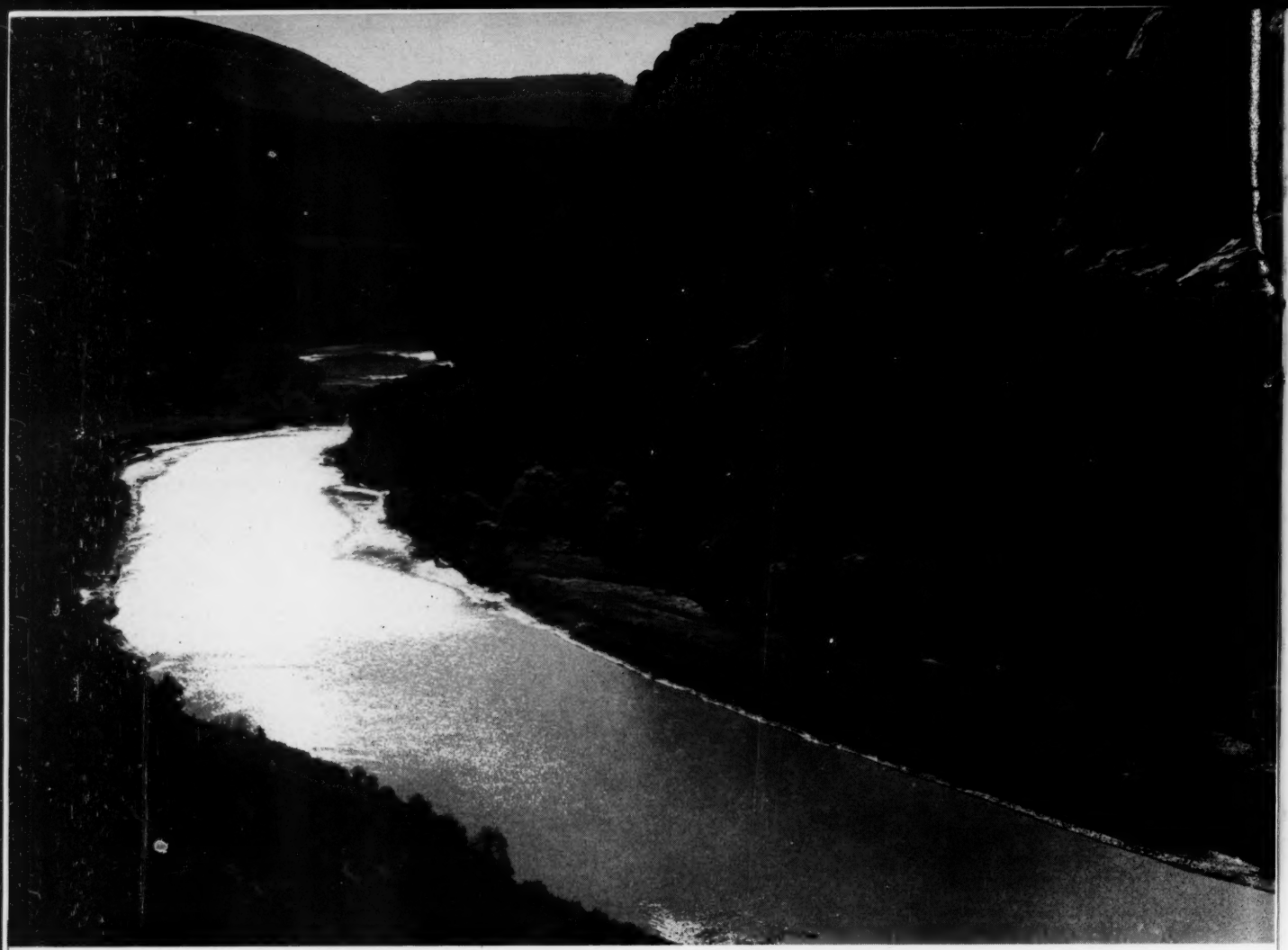
Danger to Dinosaur

The dam-builders' move to destroy a unique national monument is a grave threat to our entire parks system

INTERIOR Secretary McKay has recommended the sacrifice of Dinosaur National Monument to provide water and power, as the very first step in launching the titanic billion-dollar-plus development known as the Upper Colorado River Basin Storage Project. Citizens everywhere will wish to know: what and where is this Dinosaur Monument; what is its value as a Park; what sudden emergency is it that demands the destruction of a Park unit; what alternative solutions are there; what will this sacrifice mean for our whole national parks system; who gains by the sacrifice; who stands to lose; what will be the total cost?

Adequate answers to these questions can hardly be given in the limited space at my disposal, but it may be possible to sketch briefly the more pertinent features of the problem.

Dinosaur Monument is in northwestern Colorado and northeastern Utah. Its 200,000 acres cover the canyons of the Green and Yampa rivers, — the Green coming in from the north, the Yampa from the east. They join at Echo Park in the heart of the Monument, and together flow west to the western boundary, not far from Jensen, Utah. Highway 40 traverses the region just south of the Monument, and at Jensen it is only a few miles to the original Monument, where in 1915 an 80-acre tract was reserved for scientific study and exploitation of a rich deposit of fossil bones. The present Monument includes the earlier one, and was set



aside to preserve unchanged the river canyons for their unrivaled scenic quality.

These canyons, cutting deeply into the Uinta Plateau in meandering patterns, are of extraordinary dramatic beauty both in form and color. They are indeed unique. They are easily accessible by boat from the eastern boundary on the Yampa, or from the north down the Green. Thus a 90-mile trip through the canyons can be made either from the north or from the east, and under the competent guidance of the concessionaire, Bus Hatch, of Vernal, Utah, these trips are delightful and thrilling experiences, and made with perfect safety at a modest cost. Last summer, for example, some 500 visitors drifted through the canyons without an accident. The age spread among these visitors was from four to 77 years. One very badly crippled young man also made the trip. I stress this point because the proponents of the dam insist the river run is exceedingly dangerous, while the lakes will presumably be safe. Accidents can happen on water, of course, whether flowing or standing. The record speaks for itself.

It is a unique and thrilling experience to drift along with the current, sometimes rubbing elbows with vertical or even overhanging walls rising 2,000 feet, sometimes with the canyon walls receding step-wise to provide a park-like recess and more distant vistas. Shining beaches of sand appear frequently which invite to a swim; groves of box elder or cottonwood shade charming camp sites to be found every mile or two along the river. Now and then the placid sweep of the current changes to a more rapid pace, where the constant thrill of beauty gives place briefly to the excitement of white water and tossing waves, and the boats speed through like roller coasters. There is no rapid, however, so shut in that one cannot walk

The proposed dam would wipe out the lovely meadows along the Yampa. (Martin Litton)

around it while the boatmen run through with the boats to the quiet water below. For sheer breath-taking beauty, color, and variety there is no other canyon run in this country to equal this one – which Secretary McKay advises us to bury under hundreds of feet of stagnant water, and later mud.

The canyons can also be viewed from several points along the rim, accessible by roads which lead down to the river at several points. Since the National Park Service has been given no funds to improve these roads they are more suitable to jeeps and light trucks than to standard cars. Nor can they be recommended to visitors inexperienced in driving rough mountain roads. Many cars do, however, go in over them, and a very modest sum will make them available for anyone to drive.

The value of the Monument is largely potential – for the reasons just given, and because so few know of the availability of the river trip. Little has been written about it. Few indeed have seen it, and only those who have are in position fully to appraise its values. It may be added that Secretary McKay, who speaks with official authority for its sacrifice, is among those who have not seen the Monument. It has remained a park in escrow. But with increasing use of our accessible parks—30 millions visited them last year, and many more will visit them this year – and with many of them already overcrowded, the potential values can very easily be realized at the moderate cost of improving the roads and developing the many pleasant camp sites which these roads will make available. As has been said, the river trip offers the prize experience. It is available and inexpensive. The Sierra Club expeditions last summer provided the six-day all-expense trip for some 200 people for less than $10 a day.

The major argument advanced for destroying this unique park unit, is the necessity for storing water to meet certain downstream commitments to Mexico and to the several states concerned, chiefly California. Note, however, that even this serious argument does not explain why the Monument must be flooded *now*, as the initial step in a program requiring many dams and many years to complete. Since it has been reserved for park use, it should be considered last, and only then if all the others proved to be inadequate. There are alternate reservoir sites available outside the Monument, which will provide both storage and the power objectives sought by the Bureau of Reclamation. Against the use of these alternatives Bureau engineers argue that the loss by evaporation is too great to be allowable. This point is highly debatable – but if the figure is correct, it simply indicates gross error in the estimates of the water-producing potential of the upper Colorado basin, on which the commitments were made. To correct this error it is proposed to scuttle Dinosaur.

A mistake can rarely be corrected by making a far worse one – which I believe is the solution proposed by Secretary McKay. A realistic reappraisal of our commitments would be the logical and straightforward solution. If the Dinosaur canyons did not exist, that would have to be the solution. For Reclamation's ambitions, they should be non-existent, since they are designated national park property, for park use only. It is fairly certain that Reclamation cannot yet control the weather and the rainfall. It is also certain that it is not controlling the movement of silt downstream. Echo Park dam in the Dinosaur—and many others of the project – will silt up rapidly under present conditions. At some point of time in the not too distant future, storage and power will drop to zero. Long before that they will be greatly decreased. What happens *then* to these commitments? Since they will surely have to be revised then, it would appear wise to revise them now before communities grow up under the promise of water which cannot be delivered. Throwing our national parks into the water-mill can only postpone the day. We alter our treaties and commitments elsewhere, as often as changing conditions require. The same can be done in this situation.

The breaking of park boundaries for economic gain is itself the breaching of a long-standing commitment between the government and our people. The national park idea was born in 1864, when Yosemite Valley was reserved; Yellowstone became the first actual national park in 1872. In 1916 the program worked out experimentally over the years was enacted into law by Congress. Parks are reserved solely for the recreation and enjoyment of all the people. The hard core of the Act provides that development for enjoyment must be accomplished in such manner that the natural values of the park shall not be injured or destroyed. They shall not be invaded for commercial or economic advantage or exploitation – lumbering, mining, water-power and storage. This is a firm commitment that antedates state compacts and agreements with Mexico. In all the years since the

The dam would reduce to insignificance these towering walls of the Upper Yampa Canyon. (H. C. Bradley)

creation of the Park Service, the national parks system has been honored, defended, and strengthened by both parties, by every Interior secretary and by every administration. And now the Secretary — who is the titular head of the national parks system and dedicated by his high office to preserve it inviolate, has seen fit to recommend that it be abandoned.

Make no mistake about the significance of Dinosaur! If it can be scuttled now, for power and water storage, a precedent will have been established which can be applied with equal cogency to Glacier, Yellowstone, Grand Canyon, Sequoia-Kings Canyon, and all the rest of our magnificent and world-famous parks. This may indeed be the purpose of the decision to jettison now, at the very start of the Colorado Project, a monument which has not been seen and is least known to the owners, the American people. No park unit exists so vulnerable as the Dinosaur to this sort of attack. Once established for Dinosaur, *the proposed legislation clearly indicates that the parks are to remain inviolable only until some economic use can be made of them.*

Who gains? Vernal, Utah, for instance — the center of one high pressure area. Its citizens eagerly and vociferously demand the dams in Dinosaur so that they can personally and locally profit from the boom which will result from the millions that will be spent there during the construction period. They also hope to profit by having large power resources made available with which to attract large industries. So far Vernal has been a rather pleasant agricultural community and an oasis in the surrounding desert. The prospect of becoming a great industrial center — a Pittsburgh of the West — is irresistable to the Chamber of Commerce group which speaks for the town. Along with Vernal, Utah itself is eager to bolster its economy with the millions envisioned. Some sections of Colorado also anticipate local gain through "cheap power." If it is cheap — and the point is debatable — it is so only because all the rest of us put up the cash involuntarily through taxes. As will be pointed out later the actual cost to all of us builds up into the most extravagantly expensive installation this country has ever seriously considered.

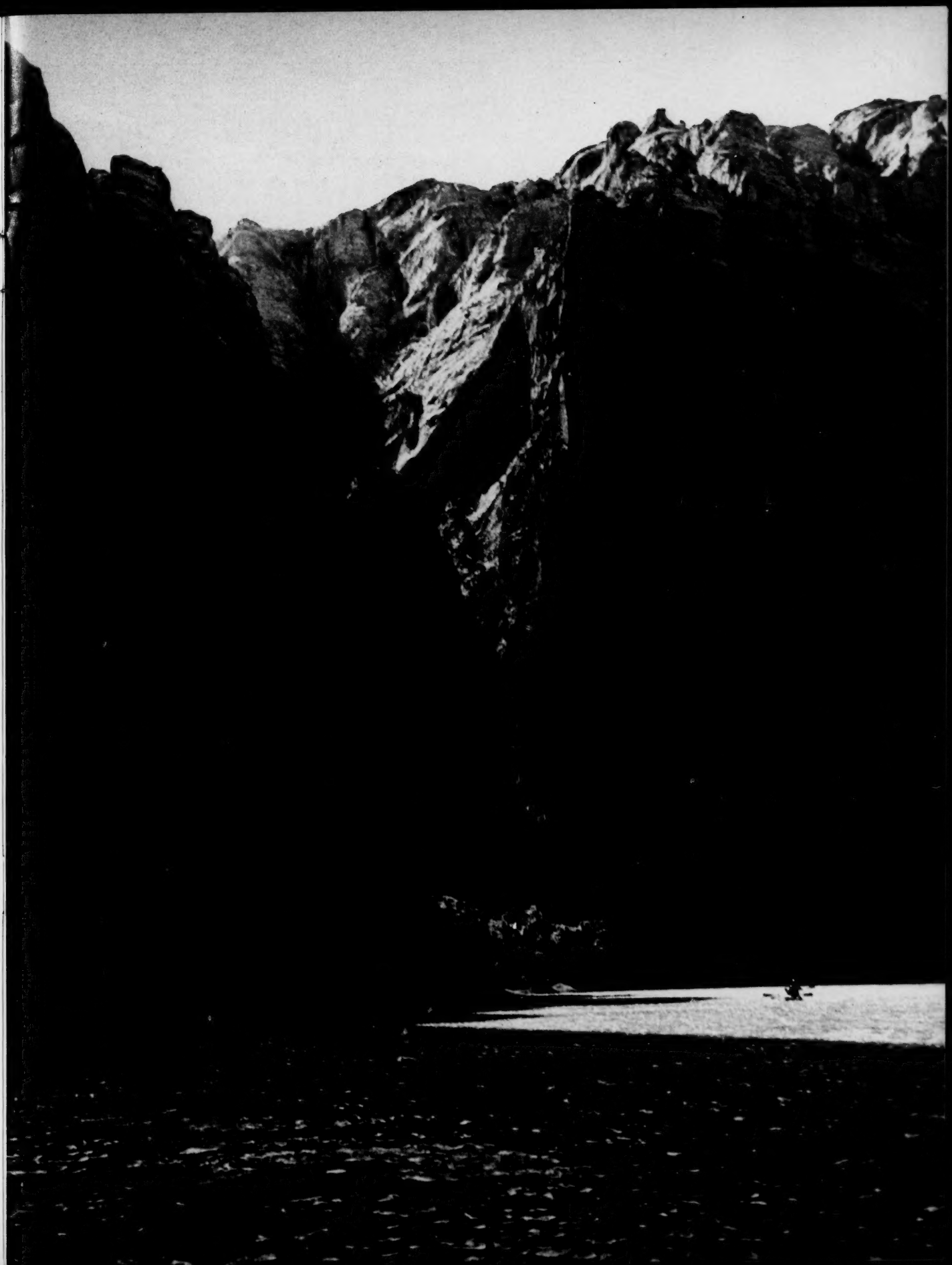
Another group determined to profit by the vulnerability of the Monument, has been the Bureau of Reclamation, and with them other big dam-building agencies, both public and private. The dam builders have been trying for years to get a foothold inside our national parks. You will recall the attempt on Glacier Park only a few years ago. You may know of the determined attempt to flood out the Mammoth Cave National Park, in the name of flood control. You may or may not know that there are several reservoir filings in Kings Canyon National Park. If approved they will quite ruin that spectacular and lovely high mountain area in the Sierra.

The job of dam builders is, of course, to build dams. They cannot be blamed for wishing to build dams on every stream that flows. They cannot be blamed for wishing to strengthen prestige and provide a long-range backlog for their jobs. Only we shall be to blame — we who employ them, and pay their salaries and the cost of the dams and the power plants — if we fail to direct them; if we allow them to grow from a public service group of experts under our supervision and direction into a super-dam-building organization, beyond our control.

Gains from the destruction of Dinosaur will evidently accrue to a very small minority of our citizens: to Vernal and its population of a few thousand; to Utah with its 689,000; to a part of western Colorado equally sparsely populated; to the dam builders — in this case the Bureau of Reclamation.

As to the costs — *we* pay the bills. *We* provide the boom for Vernal; the economic handout to Utah; the subsidized power to Vernal and western Colorado. It might be better to frankly present Vernal and western Colorado with a couple of steam plants equivalent to the Echo Park dam installation. An equivalent steam plant costs about half a hydro-electric plant to build, and it can be put up in about half the time. Colorado is rich in fuel, so operating costs will be minimal. In the long run such a gratuity will be far cheaper than for us to allow the dam in Echo Park.

The out-of-taxes estimate for the Echo Park dam is $176 million — a moderate estimate as big dams go. Since Reclamation's estimates regularly run low, we might well revise that figure to somewhere between $200 and $400 million. This is the clean-cut cash cost, and not out of line with the prices we have been paying for our big dams. If it were the only cost the decision for or against the project would be of minor importance, even in this period dedicated to a return to an economy of thrift. To the cash cost must be added the loss



of Dinosaur. No figure with a dollar sign can be set as its value. It would be like trying to arrive at the value of a great painting by adding the cost of the canvas, the paint and wages for the painter. Whether it be very great or very small will depend on your scale of values – whether you are perceptive or not to the intangibles that lie beyond a price tag. It may depend somewhat on whether you have really seen the canyons or not. Many of the citizens of Vernal consider the Monument worthless as it is – and most of them have never troubled to see it. Secretary McKay evidently considers its value small – possibly for the same reason. Of the 500 who floated through the Dinosaur canyons last summer, practically all came out filled with wonder and enthusiasm. Many of them plan to return for another view this coming summer. To those who know and appreciate the parks and who have seen Dinosaur's canyons, the Monument has a value incalculably great. Even that high value will increase by leaps and bounds, as tourists flock to it increasingly each year. Yosemite in 1893 had fewer visitors than Dinosaur Monument in 1953. But in 1953 a million visitors came to Yosemite from all over the world. Vernal – with the illusion of the "quick buck" held close to its eye – is unable to see the long range economic value the Monument will add to its economy.

When we add the loss of the Monument to the out-of-pocket cash cost of the Echo Park dam, we have only begun to reckon up the total cost. As the logical consequence of the precedent we shall have established, if this legislation goes through, there will follow the step-wise disintegration of our whole wonderful national parks system. If the cost seems staggering today, do not overlook the fact that each succeeding generation will continue to pay and compound the total.

These are some of the reasons why we do not believe this administration will wish to go down in history as the one which initiated the dispersal of what has been termed "America's Crown Jewels." These are just some of the reasons why the proposed dam in Echo Park will be the most extravagantly expensive and wasteful project this country has ever undertaken in times of peace. Liquidation of any park unit is indefensible except as a last-resort sacrifice in a national emergency of catastrophic proportions. No such emergency exists today nor in the foreseeable future.

Why, indeed, should we begin now to throw away our national parks?

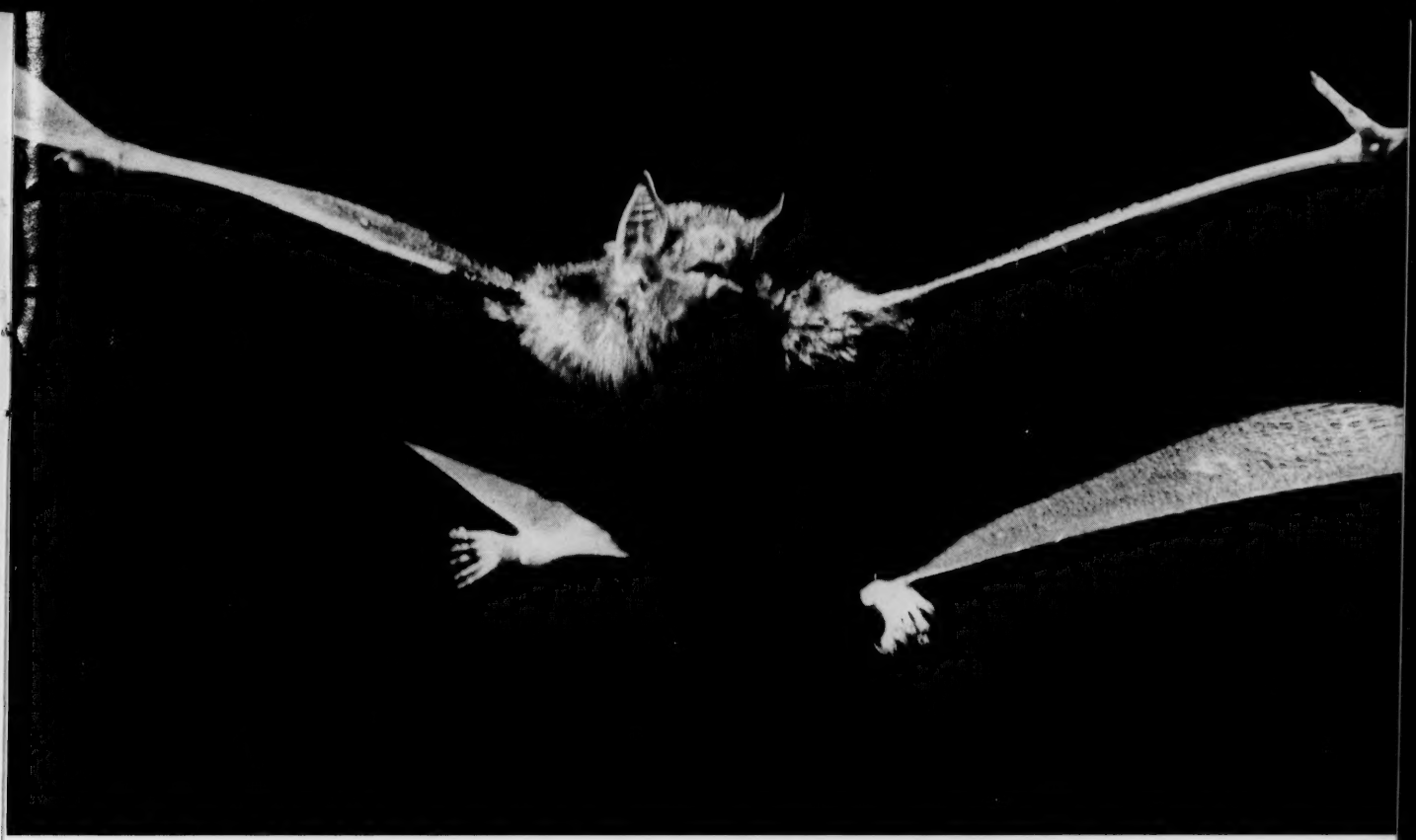
hunting mexico's VAMPIRE BATS & four-eyed fishes

lloyd glenn ingles

Photographs by the author

IT WAS only three o'clock in the morning, and the ox-cart which creaked and rattled along the cobbled street a few feet away was still quite invisible. The constellation Orion was lying on its side and, noticeably much nearer the horizon than at home, shone Polaris, the north star. Tehuantepec pueblo, in southern Mexico, was just beginning to awaken. Soon a candle flickered in a little cafe, and silhouetted figures with big hats and with serapes tightly drawn about them began to appear. I was carefully scanning each person for the likeness of a man I had met but a few hours before. His name was Thomas MacDougall; he made a practice of spending six months each year in Tehuantepec studying the ecology of a forest in that part of Mexico and collecting various kinds of reptiles, birds, and mammals for museums and scientists in the United States.

The previous evening when we met I had told Mr. MacDougall my desire to see, to photograph, and to collect some living vampire bats and the curious four-eyed fishes, both of which were known to occur not far from the pueblo. Although he had never seen *los vampiros* himself, he knew precisely where to go to catch the *cuatro-ojos* because he had caught these little fishes and studied



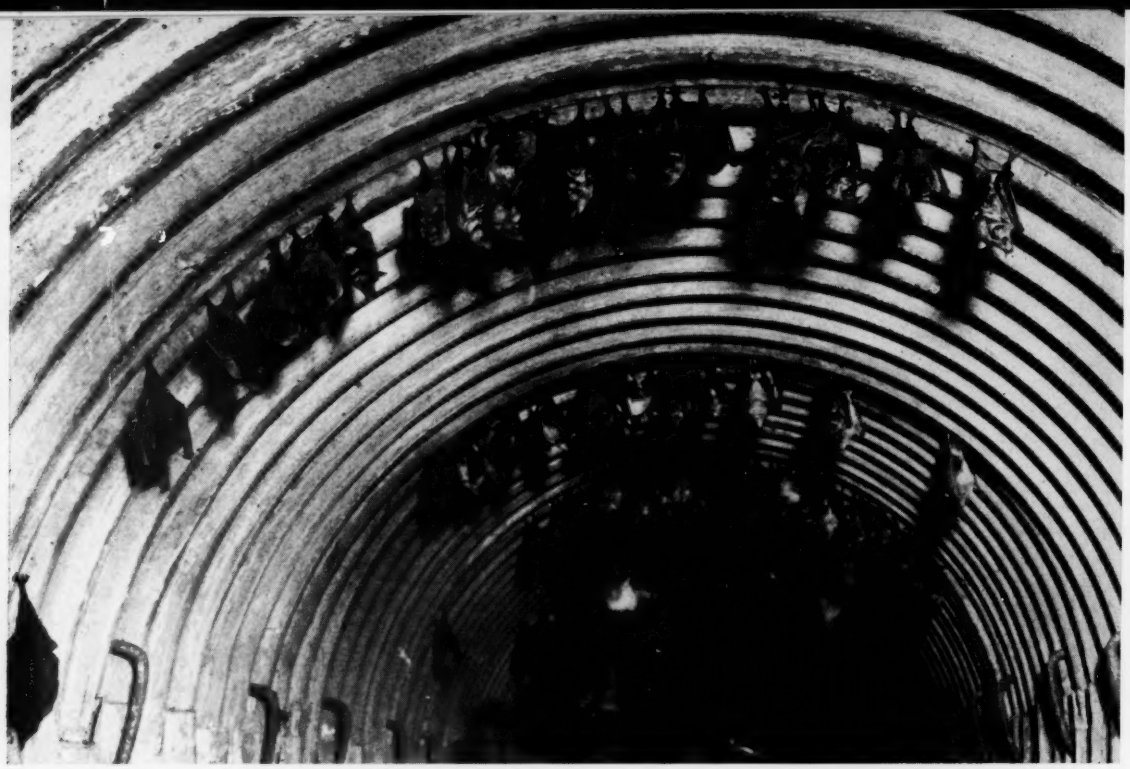
their interesting behavior a couple of years before. We agreed to meet at the little cafe early the next morning. He would bring with him an Indian boy who he was certain could lead us to the caves where the vampires lived.

It was almost dawn before the two men appeared and I had the pleasure of meeting the Zapotec "boy" named Chico who Mr. MacDougall believed knew more about the animals and plants of that part of the state of Oaxaca than any other person. From the first I felt confident the expedition would be successful because Mr. MacDougall himself was going along. He not only spoke much better Spanish than I, but he had considerable facility with the Zapotec idiom, a very useful accomplishment when one needs to find a particular animal or plant in a region where the Indians know only their own names for them.

I was somewhat impatient to get under way, but Mr. MacDougall and Chico had far too many friends among the natives who were gathering for the early morning bus soon to leave for Tuxtla Gutiérrez. Mr. MacDougall apparently sensed my restlessness and twice explained the importance of being deliberate—everybody, it seemed, had some sort of urgent business with one or the other of my companions, and as I was introduced to each person I suddenly realized these natives *were* different from any I had seen elsewhere in Mexico. Occasionally there was a person with blue eyes or red hair, and not infrequently a husky, tall, and beautiful woman appeared wearing the native costume including a necklace that usually contained one or more perforated U. S. gold pieces. Unlike the women in other parts of the republic, they talked freely with the men and more than once their conversation left no doubt that the *mujer* was the dominant member of her family.

Later Mr. MacDougall and others told me how these natives happened to be so different in appearance from those of other pueblos. Briefly, it seems that during the gold rush to California following 1848 many gold seekers chose to cross the Isthmus of Tehuantepec rather than chance the more arduous and dangerous routes overland, around the Horn, or across the Isthmus of Panama. After the exhausting journey on foot they rested at the friendly little pueblo, often waiting a considerable time for ships to carry them on up to California. Then, there was the other story of laws unfavorable to Catholics passed during the term of one of the presidents. For a time a holy

▲ The vampire bat *(Desmodus rotundus)* has a wing spread of about 12 inches and superficially resembles several other small bats. Its long razor-like teeth, certain features of its digestive tract, and peculiar behavior traits—especially that of feeding on the blood of other vertebrates—are special adaptations that make it the only truly parasitic mammal in the world.



This 3-foot road culvert was home to hundreds of long-tongued bats (*Glossophaga soricina*).

war seemed imminent, and a group of Irishmen rushed to Tehuantepec to partake in the fracas. Apparently, both of these groups of invaders from the north left more than U. S. gold pieces during their somewhat protracted stay in the pueblo.

The bus, now bulging with passengers, pigs, chickens, turkeys, and other impedimenta, rattled down the street in the early dawn. The crowd dispersed, and *at last* we got started.

For the next two hours the three of us rode over one of Mexico's fine highways in my car. It was an unforgettable ride. Beside the road lay a six foot boa constrictor, killed by some passing auto. Black vultures had already begun to gather for their reptilian breakfast. These coal black scavengers, which even perch on the roofs of the cathedrals and houses in this part of Mexico, see to it that very few dead animals ever reach the stage of decay. Flying about were squawking flocks of yellow-headed parrots, and somewhere just off the road in the thick thorny brush a couple of chachalacas clamorously protested some intruder in their thicket domain. Most interesting of all were the small flocks of magpie jays. These large and colorful jays are nearly two feet long. On their black foreheads a long crest bends forward over the bill. Their bright blue backs and white underparts contrasted boldly as they sought cover in the scrubby chaparral beside the road. I would like to have taken time for a picture but we were already late, and they were very shy.

Everything along the road seemed designed to divert attention from the real purpose of our trip. But in spite of the distractions we at last parked the car and Chico led the way down the side of the road to a culvert beneath the highway where he said hundreds of vampires lived. The culvert, a steel pipe about three feet in diameter, was nearly 100 feet long. It was bent at the middle so we could not see through to the other end, but as soon as I entered the opening I could easily feel the agitated air caused by the beating of hundreds of wings back there in the darkness. Chico had previously told us vampires were so numerous in this particular region it was impossible for the natives to raise chickens. I knew these bats attacked human beings and preyed on domestic animals such as goats, sheep, horses, and burros, but I had never before heard that they fed on birds of any kind, although I have later learned it has been reported in the literature that vampires attack domestic fowl. Chico said the burros' habit of rolling on the ground to rid themselves of vampires is frequently the first warning the natives get of the presence of the bats. Unlike the cagey burros, most other animals remained quiet even as the razor-like

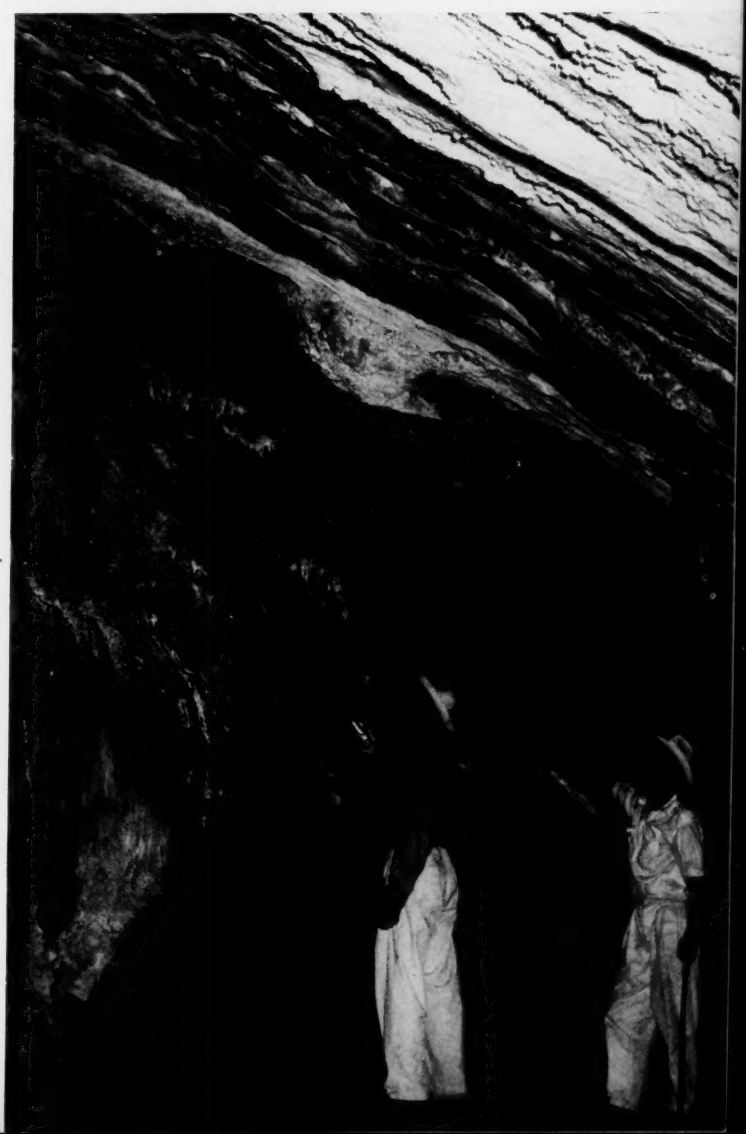
teeth of the little blood - drinkers slice a neat wound on their shoulders or legs and begin to lap up the freely flowing blood much as a cat drinks its milk. In order to prevent vampire bat bites on themselves the natives hang a serape from the top of the door to within six inches of the floor. Cats are encouraged to sleep in the house in the hope they will catch any bats flying in low beneath the serape.

In Guatemala a few weeks later I talked with a dentist's wife recently bitten by a vampire bat. She said she was first aware a bat was in the room when its fanning wings awakened her, presumably just as it was finishing its sanguinary meal, for a vampire rarely flies to its host directly. Instead, it normally alights near by, then approaches by running, mouse-like, quickly and apparently painlessly opens a wound with its sharp, specialized front teeth, and begins to lap the blood. The young lady said she did not even know she had been bitten until she saw blood on the pillow, and the mirror revealed it still flowing freely from a little wound on her temple.

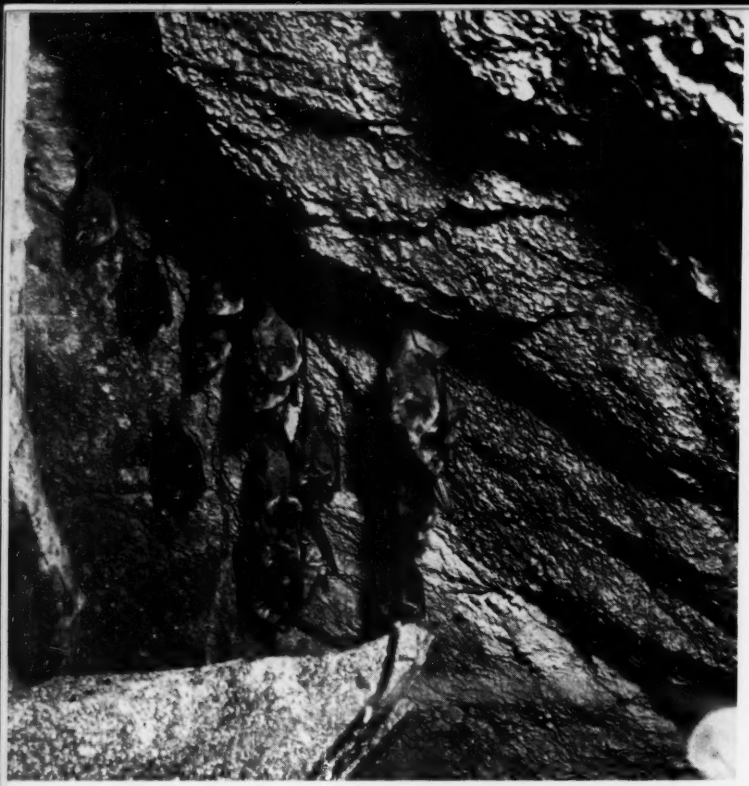
The fact that vampires were known to be carriers of rabies made me somewhat apprehensive as I entered the culvert with my flashlight and camera. Over fifty persons were known to have died of bat-carried rabies in Mexico within the past two years, and near certain large bat caves rabies are very common among cattle, goats, and wild animals. Nevertheless, with Mr. MacDougall guarding one end of the culvert, and Chico at the other I made up my mind that if I wanted vampire pictures and specimens I would have to go after them. In the beam of my flashlight I could see hundreds of beating wings in the tunnel ahead of me. As I continued to crawl forward bats flew around my head, under my arms, and between my legs. I am sure I shall never be in such a concentration of chiropterans again. It seemed incredible that there could possibly be enough vertebrates in the region to supply blood meals for so many. Certainly, I thought, blood-letting by these dusky shadows of the night must be far greater than I had ever dreamed.

In the crowded confines of the culvert I finally managed to make a few flashlight exposures. With a small insect net I caught and sacked about a dozen specimens in a short time. Then, with my equipment and animated captives, I started back toward the opening. It was not until we examined one of the squirming, protesting little bats after I emerged from the tunnel that we learned, to my disappointment, to Mr. MacDougall's disgust, and to Chico's chagrin, that they were not vampires after all but were the long-tongued bat which is a flower - frequenting species. Later, I was glad things worked out as they did, because it was my first experience with leaf-nosed bats, some species of which do considerable damage by nibbling the ripe fruits of the coffee and other fruit trees throughout tropical America. The fleshy protuberance on the noses of these little bats gives their heads a superficial resemblance to that of a miniature rhinoceros.

I dissected one of the long-tongued bats when I returned that evening to Tehuantepec and found the part of the tongue that extended beyond the mouth was actually longer than the head. Its end was provided with a sort of brush and it is thought this specialized tongue aids the bat in extracting insects and possibly nectar from the deep corollas



Mr. Thomas MacDougall and Chico, the Zapotec, searching for roosting vampire bats in a cave north of Tehuantepec. The vampires appear to live only in certain caves from which they fly silently each night to seek their only food — blood.



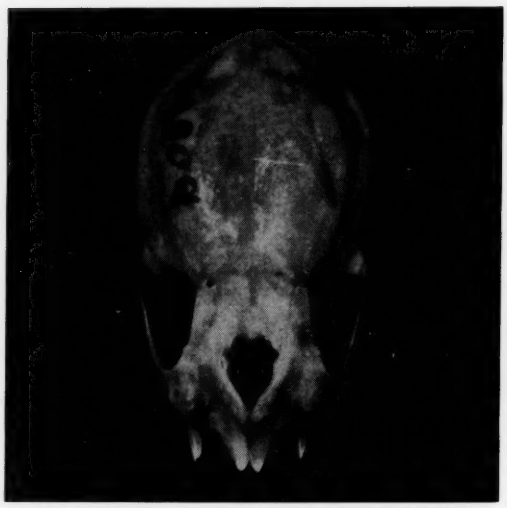
the works of these people – whether they feared it or revered it perhaps we shall never know.

As we moved slowly back into the darkness with our flashlights Chico suddenly stopped and pointed to shiny black piles of sticky viscous material on the floor of the cave. "*Sangre de las ovejas* (blood of the sheep)," he said as he examined the

◄ Almost every cave in this part of Mexico harbors clusters of long-tongued bats. Because it appears to be tailless, as the true vampire actually is, the natives frequently mistake it for the blood-lapping species.

► Vampires can run faster than most other kinds of bats, and look something like large tarantulas as they scramble across the walls of their cavern homes. Normally, a vampire is thought to creep up on its victim rather than to fly directly to the place where i topens a wound for its meal. The flowing blood is lapped, not sucked.

▼ Skull of a vampire, showing the razor-like teeth. (About three times natural size. C.A.S. photo by Robert T. Orr)



of flowers, or perhaps also it may be used in lapping up the juices of fruits punctured by the tiny sharp teeth.

It was not long before we were on the road once more. This time we were going to a cave where Chico was very sure *los vampiros* would be found. Soon we parked the car beside the road and after an hour of hiking behind his slashing machete we arrived at the mouth of what appeared to be a small cave at the base of a 50-foot cliff. The entrance was covered with so much brush it was not until Chico had worked several minutes that we were able to enter it at all (I still wonder how the Zapotec was able to lead us without any obvious trail directly to its hidden entrance). Once inside, the cave proved to be much larger than one would at first suspect. The room was fully 100 feet in diameter, with longer tunnels leading back into total darkness. The irregular ceiling ranged from five to 20 feet high, and sooty places along the walls showed the room had on many occasions been lighted by the camp fires of men – perhaps prehistoric men – for centuries. How did the early ancestors of the present-day Zapotecs fare with the vampires, especially if they lived and slept in the same caves? In Mitla, Oaxaca, I met Mr. Howard Leigh, an artist and collector of art pieces of early man in that part of Mexico, and he told me he felt sure the bat was represented frequently in dome-like cavities in the ceiling for vampires directly above the piles of black fecal material. Then we saw running rapidly across the wall of the cave, and somewhat resembling a giant tarantula, an undoubted vampire bat. Others were soon discovered, and I had the good fortune to catch one with our net as it flew rapidly overhead. While Mr. MacDougall and Chico occupied themselves in capturing others for specimens, I made close-up exposures of my somewhat stunned captive with the photoflash and still camera. I was elated at our final success. At last my objective of seeing, pho-

tographing, and collecting from its native habitat a species of the only truly parasitic mammals in the world had been achieved.

Because of their importance as carriers of rabies vampire bats are being extensively studied by the Pan American Sanitary Bureau under the able leadership of Dr. Aurelio Malaga-Alba, supervisor in Veterinary Public Health for Middle America. It is important to understand the ecology of the bats before effective controls can be recommended, but as with so many other mammals of Latin America there is very little known about their life history and ecology. For example, some caves seem to be favored resting and breeding places while others apparently equally desirable are never used. Two large caves near Mitla, Oaxaca, were occupied by vampire bats in August, but when I returned to them in November not a vampire could be found although other species were present. Where the vampires had gone in the meantime no one knows. Possibly they migrated to a lower level for the winter months. Until the answers to these and other fundamental problems are forthcoming, effective controls are impossible. According to Dr. Malaga-Alba vampire bats are known to occur within one hundred miles of the southern border of the United States. It is possible that canine carriers might spread the dangerous virus of rabies from infected animals around the bat caves into our border states. Thus, although they are not native to the United States, the vampire bats may one day become a problem affecting the lives of people living north of the Rio Grande.

A couple of hours after we collected the last vampire bat we stood on the banks of the Río Tequisistlan, a branch of the Río Tehuantepec which in turn flows by the pueblo on its way to the Pacific Ocean. After our recent experiences with the vampires one might think anything the four-eyed fishes might offer on the same day would be anticlimactic. Such was not the case, however, because these curious little fishes proved to be so unlike anything I had ever before experienced. As they swam about in schools of 10 to 30 at the surface of the stream their heads were half out of the water. They could easily spot us while we were still over 100 feet away. After seeing us approach, the entire school immediately turned and sped upstream, and we realized that if we were going to be successful in getting specimens and pictures of these shy creatures, we would have to change our tactics which up to now consisted of merely trying to slip up on them with our little insect net.

Chico tried to get above the school by making a long detour away from the stream. Then he waded waist deep down the middle of the river and

A four-eyed fish swims up to the water's edge where it feeds on insects that fall into the river and slowly drift to shore. With its periscope eyes it can see floating food in shallow water as well as enemies on land or in the air at least 100 feet away.

thus he attempted to drive the fish toward the spot where we waited with our insect net ready to try for the catch. When suddenly frightened by our movements, however, the entire school rushed across the surface of the water with surprising speed. They actually "stood" on their vibrating tails and resembled small outboard racing boats. Sometimes an occasional fish would actually take to the air and land on the surface again a few feet ahead of the wiggling, shimmering school. Time after time we tried to drive some of them into shallow water or into a small pool beside the main stream, but the results were invariably the same. We were always outwitted and outmaneuvered.

Chico came to the rescue at last by telling us of a little pueblo about a mile down the river where some of the Indians regularly caught the four-eyed fishes for food. It seemed almost certain they would be better equipped to do the job than we were, and so we rapidly hiked away over a streamside trail to pay them a visit. We soon found Pedro, the village fisherman, but for some unexplained reason he was disinclined to catch the four-eyed fishes for us that day. We asked others in the pueblo to help us, offering each one what seemed to Mr. MacDougall exorbitant pay for the service. Pedro was apparently regarded by the whole village as the only person competent to catch the *cuatro-ojos,* or perhaps it was his monopoly. Everyone we spoke to referred us back to him. It was only after considerably more Spanish and Zapotec had been employed by Mr. MacDougall and Chico respectively, and I might add, more pesos from me, that Pedro finally took up his circular net and reluctantly led us back to an open place in the river.

It was wonderful to see the ease with which a properly equipped and skilled person could do what was for us impossible. He simply waded out and stood still in the stream with his net ready to throw. When the four-eyed fishes, which had scampered wildly upstream as we approached, slowly drifted back within range he cast his net with incredible speed, and we soon had five of the squirming *cuatro-ojos* on the wet sand beside

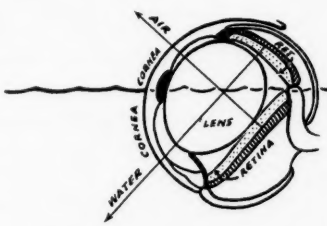


Diagram of the eye of the four-eyed fish *(Anableps)*, after Walls. Bean-shaped black area between cornea and lens represents the dividing tissue between upper and lower parts of the eye.

us. Mr. MacDougall preserved some, while I made my photographs and notes on the living specimens. It was Mr. MacDougall who, after he had studied their striking behavior, had actually taken a pail of these remarkable little fishes all the way

back to New York City for exhibit two years earlier. I believe these were the first living specimens ever to be shown in the United States.

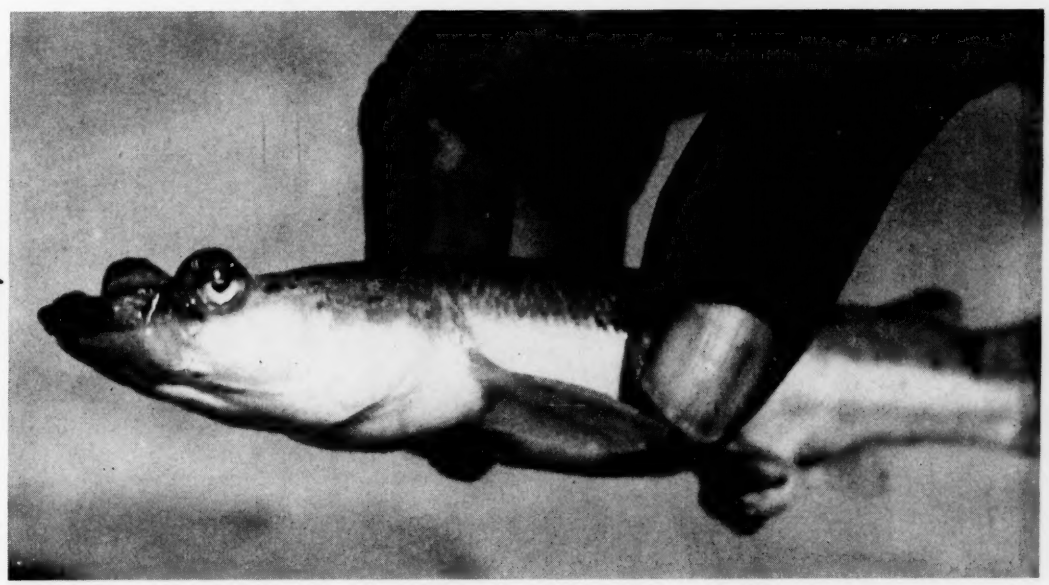
Months later, after I had an opportunity to dissect a four-eyed fish, I learned how marvelously adapted these little creatures really are. They have only two eyes, but each one is divided horizontally by an opaque band of tissue which has grown across the pupil. This division of the eyes is at water level and gives the appearance of two eyes on each side of the head, one looking down into the water, the other looking out into the air.

The spherical lenses of aquatic vertebrates are generally thicker than the elliptically-shaped lenses of animals living on the land and seeing through the air. As might be expected in a fish that sees in both environments, the lens in the *cuatro-ojos* eye is a happy combination with its thicker part in the lower half of the double eye and the thinner part of the lens in the upper half. The lens is shaped and arranged so that light coming from beneath the water enters its lower half in such a way that the distance the underwater light travels through it is much greater than that traveled by the light from the air above. Thus, the double purpose eyes of these little fishes are adapted to see perhaps equally well in water and air at the same time. I feel sure this adaptation not only enables them to escape their enemies effectively, but also permits them to utilize a peculiar food niche.

In the quiet open pools of the river there are many insects that fall and finally drift toward the sandy shore where they form a little windrow of concentrated potential fish food. Here is a food niche apparently not used by other vertebrates. On another visit to observe the four-eyed fish I watched them swimming close along the shore and occasionally feeding on the helpless floating insects at the very edge of the shallow water which they could easily see with their "air" eyes. I am inclined to doubt the claims of the natives that they ever actually leave the water to come out on the wet sand even a few inches after a large choice insect.

When badly frightened or closely pursued the four-eyed fishes will invariably dive to the deepest hole and remain there until all danger is past. Thus, although their security is in deep water, their food source is chiefly at the surface.

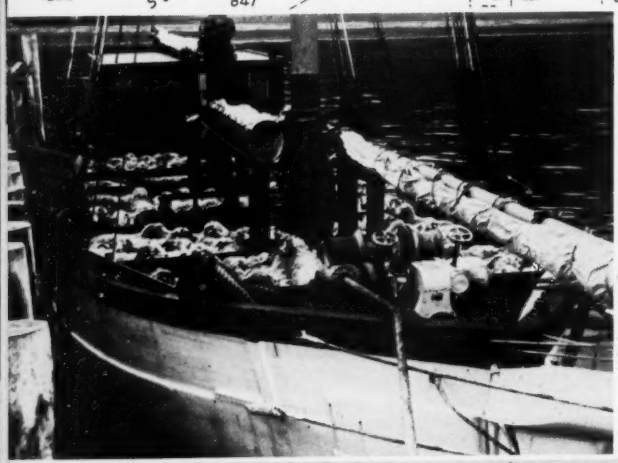
It was dark when we got back to Tehuantepec. Returning ox-carts rattled again over the rough streets and the candles burned once more in the little cafe where the Tehuanas were now serving the evening meal. After I left my companions at the old La Perla Hotel, I began to think how full my day had been. I recalled other days studying curiously adapted animals, but in my entire life as a zoölogist none had been more interesting and exciting than this day with the blood-lapping bats and the four-eyed fishes of southern Mexico.



Close-up of a four-eyed fish showing how a single eye is "doubled" by a horizontal growth across its middle (see diagram, opposite page). The fish usually swims at the surface with only the upper eye above the water line, sees both above and below water at the same time. Some of the natives eat the *cuatro-ojos*. (Photograph by Thomas MacDougall)

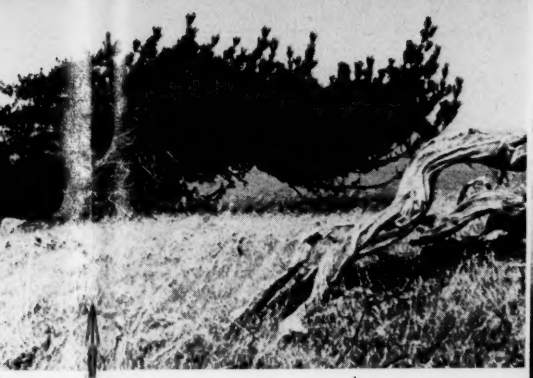
CALIFORNIA'S OFFSHORE ISLANDS

PHOTOS BY **M. Woodbridge Williams**

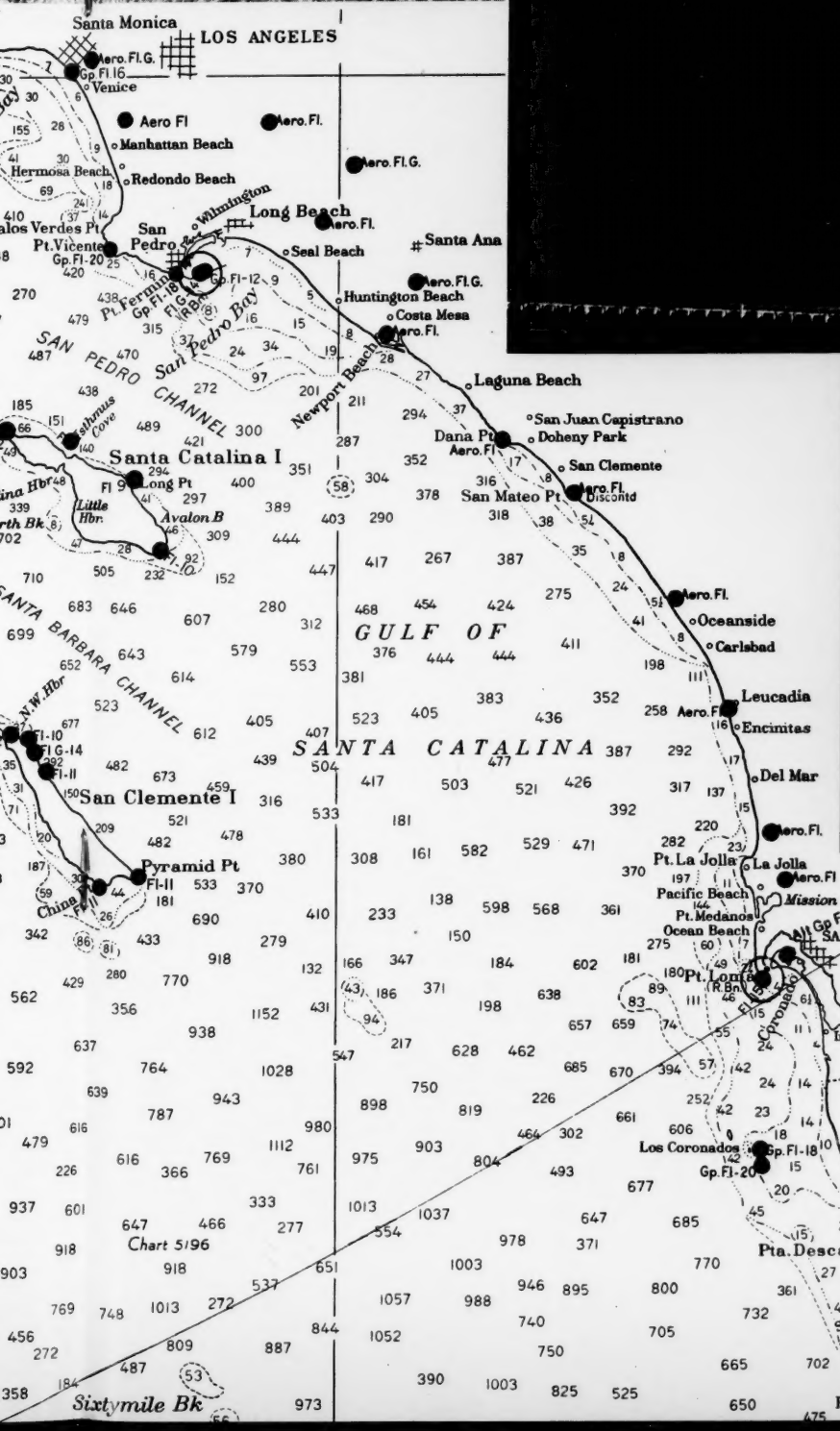


← *(Above)* **The schooner *Santa Cruz* hauls livestock to and from Santa Cruz Island. Fifteen years ago sheep were raised; today it's cattle.**

***(Below)* On clear days, the Santa Barbara coast looms above the haze 25-30 miles from Santa Cruz I.**



← A wind-carved Bishop pine clings to the bluff near Pelican Bay, Santa Cruz Island. The north slope was once densely populated with these pines, but fires set by careless visitors destroyed large stands about 20 years ago. The island is now "closed."



↑ *(Above)* Looking across China Bay towards the east end of Santa Cruz Island where a ridge runs almost at right angles to the main axis of the island.

(Below) The tree poppy brightens island slopes in summer with large yellow blooms. This species, *Dendromecon Harfordii*, is confined to the Santa Barbara Islands.

CHART: part of H.O. 5760, U. S. Navy, Edition of March 1942, corrected to 1953.
Scale: 1 inch = 15 sea miles.
Meridian of Huntington Beach, 118°W., Orella-Naples, 120°W.
Soundings in fathoms.
Latitude of Pt. Dume, 34°N.

SANTA CRUZ—An Island Museum

CALIFORNIA has many fascinating byways. Some of them lead out to sea. Most of these cannot be gained by the purchase of a ticket. They are only reached through the kindness of their owners. Such is the course for Santa Cruz Island whose lofty ridges beckon from 25 miles out to sea off the Santa Barbara coast.

This island magnetizes scientists just as Catalina does tourists. It holds a treasure-trove of natural history. Darwin would have reveled in its endemic populations of jays, foxes, skunks, snails, slugs, and several plants. He would have found an island where new forms have arisen, where others have persisted while their kinds died out on the adjacent mainland in postglacial times.

Santa Cruz is a natural museum where bits of California topography have been jammed together on an island 24 miles long: jagged basalt uplifts; a stream transplanted from the Sierra; a faulted hidden valley; deep canyons with great oaks; cool slopes of pine; rich fossil deposits of giant oysters; diatomaceous earth; sea caves — and terrain that will turn shoes to shreds after several hikes. There are also human relics.

Adobes date from the Spanish occupation. On the venerable ranch in the hidden valley fine California wines were once made. There is a wee church in a hay field; there are the kitchen middens — grave-yards of the Chumash, the only aboriginal tribe to build a plank canoe. And as you would expect, there are stories. Their titles — some darkly suggestive — are written across headlands and bays: Smugglers Cove, Hungry Man's Gulch; Prisoners Harbor; China Bay and Potato Bay—yes even Santa Cruz.

The island's name, according to legend, was derived from a priest's staff that had been left on neighboring Santa Rosa Island. An Indian found the staff and returned it to the priest. As the staff bore a small cross, the area became known as the "Holy Cross" but in the confusion of early charts, the name was transferred to the larger island that had originally been called "La Isla de Gente Barbuda" by an earlier visitor, Vizcaíno in 1603.

Wild boar, sheep, and cattle are also reminders of the white man's interest in the island. Some areas have been heavily grazed, yet much of the natural flora and fauna remain.

Those fortunate to visit the island may still wander through wild and intriguing chasms where the silence is only broken by the croak of a jet black raven perched on some lofty pinnacle.

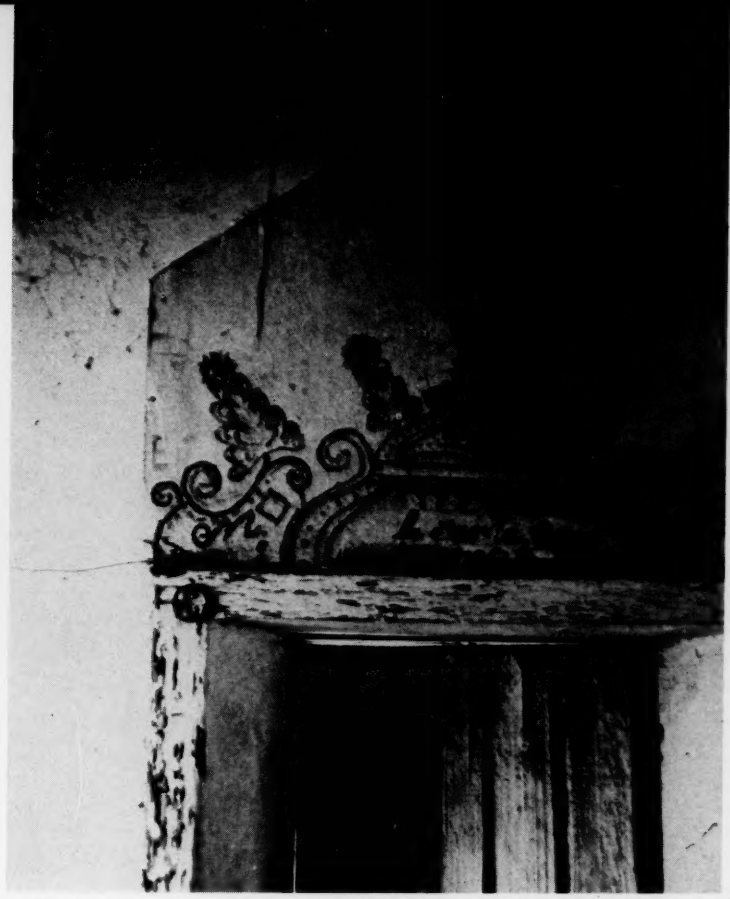
← Sierra Blanca forms a prominant crest along the south side of Santa Cruz Island. A few pines cling to the rocky ridges.

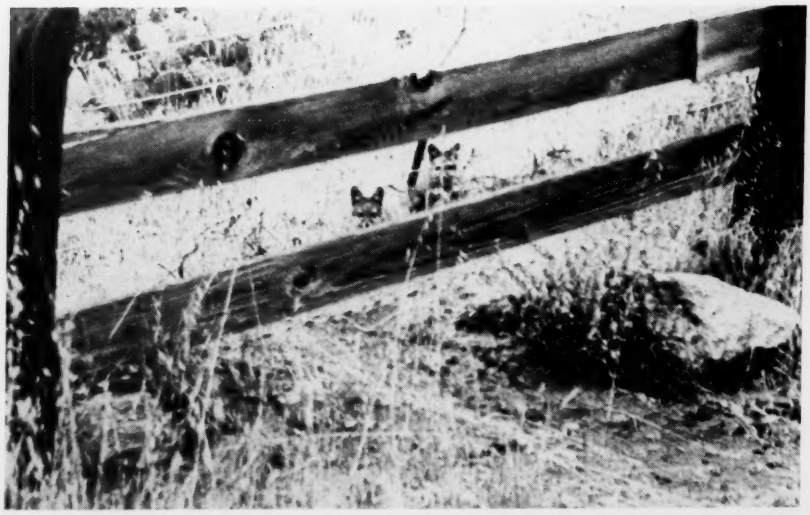
→ Relic of the Spanish occupation: This ornamented doorway was found in an old adobe at Christy Ranch on the west end of the island.

↓ A hidden pastoral valley lies along a fault which runs through the axis of Santa Cruz Island. Fine wines were once produced in this valley, but in recent years the island has become sheep and cattle range.

Story and photogaphs by

M. WOODBRIDGE WILLIAMS

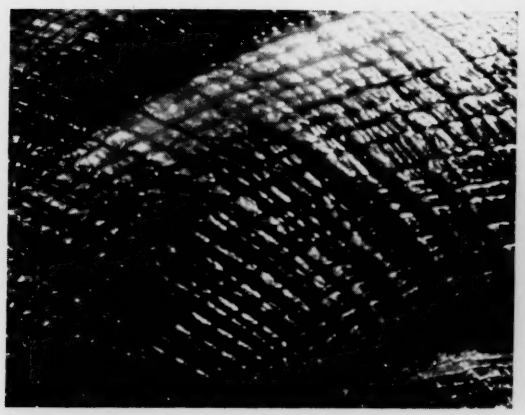


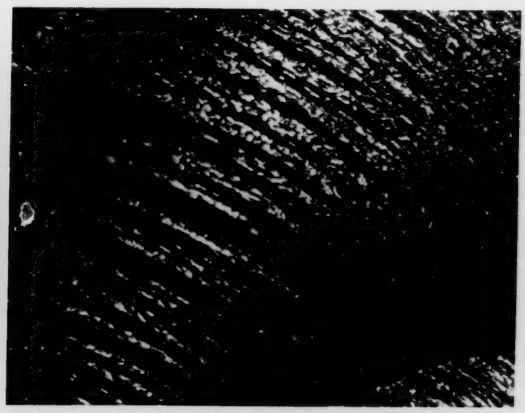


➔ Among the tall wild oats you will occasionally see a flash of brown and a bushy tail, then a pair — or perhaps two pairs — of bright eyes regarding you from some vantage point. "Cute" would tritely but aptly describe the gray fox on Santa Cruz, which zoölogists consider an endemic race. Their numbers on the island appear to fluctuate rather markedly.

➔ Stratified layers of diatomite (diatomaceous earth) lie along the coast of Santa Cruz at Smugglers Cove.

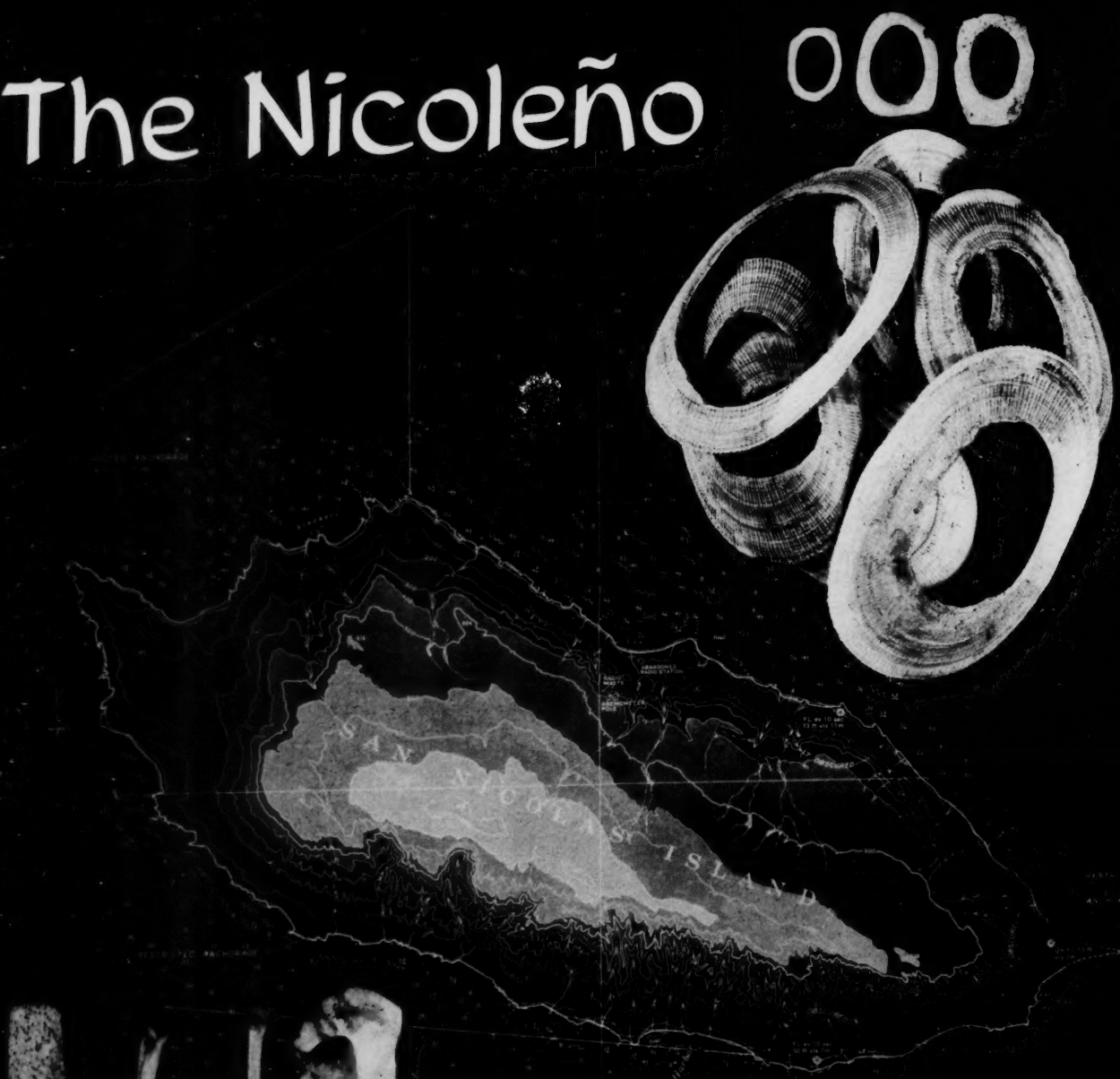
The Catalina ironwood *(Lyonothamnus floribundus* var. *asplenifolius)* forms luxuriant stands on Santa Cruz Island. The tree belongs to the rose family, but has no close relatives on the mainland.

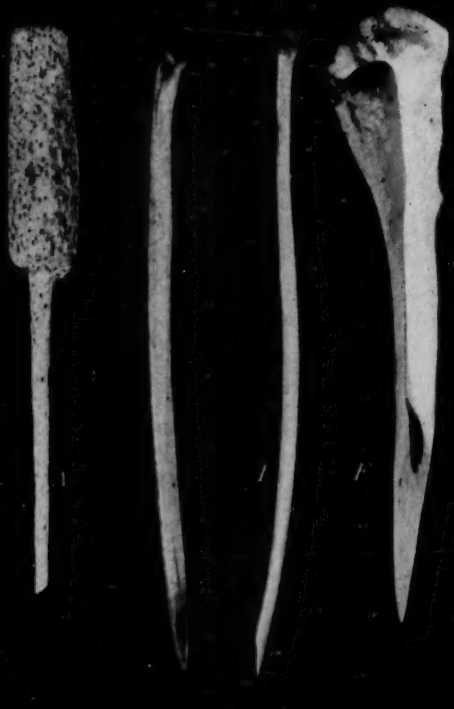




Close-up of an endemic: photo *(left)* shows sculpture of the common island land snail, *Helminthoglypta ayresiana*, of Santa Cruz, Santa Rosa, and San Miguel. The Santa Cruz form has been termed a subspecies, but even among its own separate colonies there is much variation in sculpture as the second photo *(right)* shows. The first is typical, but between the two samples there is much intergradation in the same colony. Since *H. ayresiana* has no close relatives on the mainland, its island isolation makes it useful for studies in speciation.

The Nicoleño





CLEMENT W. MEIGHAN

'Desert' San Nicolas Island once supported 1,000 Indians, yet white men call it worthless

SAN NICOLAS ISLAND, a small semi-desert patch of land southwest of Los Angeles and 55 miles from the coast, has long attracted the attention of archeologists. Between 500 and 1,000 years ago, the island supported several Indian villages and maintained a population which has been estimated at more than a thousand people. Such a population is not exceedingly dense by modern standards, but the usual Indian populations were quite sparse and a population of a thousand on San Nicolas' 32 square miles would represent a very crowded settlement by aboriginal standards.

The abundant archeological remains which have been reported by numerous scientific expeditions to San Nicolas indicate that the island had many attractions for a native people. This comes as a surprise to the modern visitor, for San Nicolas has little in the way of scenic or climatic attractions. Indeed, early visitors to the island were unanimous in reporting it to be a dismal place for anyone to live. There are no harbors suitable even for small boats, the land is mostly a sandy waste without trees of any kind, sand storms due to the heavy winds are frequent, and a cold and clammy fog shrouds the island much of the time. San Nicolas is definitely not one of the resort spots of California, and except for some short-lived attempts to raise sheep on the island, it has been of use only for scientific and military purposes.

At the present time, San Nicolas is under the control of the U. S. Naval Air Missile Test Center, Pt. Mugu. Through the coöperation of Captain E. M. Condra, Jr., Commander of that station, the writer, accompanied by H. E. Eberhart of the University of California (Los Angeles), was permitted to spend several days on San Nicolas early in 1953 for the purpose of recording and mapping the archeological remains of the island. San Nicolas is now closed to casual visitors, and formal permission from the Navy is necessary for visiting this installation.

The remains of former Indian villages are found in all parts of San Nicolas. These village locations are usually on top of sand dunes, and they are marked by a litter of sea-shells, animal bones, burned stones from fire-places, and discarded tools and weapons. Such a location is called a kitchen midden — it is a spot covered with the debris of everyday living and representing a location where people once lived for some length of time. A total of 68 such extinct villages, some of them covering several acres, have been located on San Nicolas. The Indians had their houses on top of the dunes, amidst the discarded refuse of cooking over open fires. They also buried their dead, accompanied by offerings of shell beads and other ornaments, in the sandy midden soil.

It should be noted that not all of San Nicolas' 68 villages were occupied at the same time. From what is known of the living pattern of California Indians, it seems certain that the Indians of San Nicolas moved from place to place as the food supplies of each region were depleted. Even in the small area of San Nicolas, there was probably a seasonal migration to favored spots for fishing, hunting birds, and perhaps gathering some wild plant food. Aside from this consideration, we do not yet know how long each of the village areas was used. The total number of villages covers a time span of several hundreds, perhaps even thousands of years, and some village locations must have been abandoned long before others came into use. Thus, not more than five or six of the villages may have been actually inhabited at one time. The problem of determining which villages were contemporaneous remains to be solved by future archeological work.

Skeletons of the San Nicolas Indians show that they were a robust people. This skull ws uncovered by the wind which blew away most of a sandy cemetery on San Nicolas.

(Upper right) **Limpet shells *(Megathura)* were used to make ornaments. The shell has an oblong opening in the middle surrounded by a thick ring of enamel. The Nicoleño apparently broke out the centers and ground down the edges. Three finished ornaments above. *(Lower left)* Three bird bone awls and an object of sea mammal bone. CHART: USC&GS 5113. *Scale of reproduction: 1.75 inch = approx. 2 sea miles.* Contour interval: 100 feet; highest elevation: 907 feet. Soundings in fathoms. Intersecting lines in center of island: 33°15'N, 119°30'W. Five minutes between parallel lines.**

Remnants of a Nicoleño village site which has been largely destroyed by erosion. (Official U. S. Navy photograph)

The objects found in the soil of the extinct villages provide us with practically all the knowledge we have of the people who lived on San Nicolas in pre-Columbian times. Although we know that there were Indians on San Nicolas at the time of the Spanish entry into California, the people became extinct early in the historic period and only fragments of their language and culture have been preserved. It is not known for certain what destroyed the Indian culture of San Nicolas, but most likely it disappeared under the same causes which affected the other southern California Indians: removal to the Spanish missions, new diseases to which the Indians had no resistance, and adoption by the Indians of the white man's way of life. In addition, early traders placed Aleut fur-hunters on the island, and according to one account these killed most of the native inhabitants.

For the sake of convenience, the Indians of San Nicolas have been called the Nicoleño by Professor A. L. Kroeber of the University of California. This is of course not the Indians' name for themselves, but it serves as a simple way of referring to the "people of San Nicolas."

The very last of the Nicoleño lived until 1853. Some years earlier, in 1835, a handful of Indians remaining on San Nicolas were removed to the Mission at Santa Barbara. A lone woman was somehow left behind and lived entirely alone on the island for 18 years until she was at last found and taken to the mainland in 1853. This woman, referred to in popular accounts of the period as the "Lost Woman of San Nicolas," could no doubt have told a story which would eclipse Daniel Defoe's tale of Robinson Crusoe. The true meaning of the word "solitude" is certainly conveyed by the image of the "Lost Woman" spending a lifetime alone on a barren and windy island, yet within sight of the mountains of the mainland and probably within sight of occasional fishing boats which visited the region.

By the time the last Nicoleño had been taken to Santa Barbara, all of her people who had been removed 18 years earlier had died. Nobody could

The bones of the Nicoleño lie strewn over the surface of their wind-bared cemetery. (Official U. S. Navy photograph)

be found who spoke the woman's language, and since it was not possible to communicate with her except by sign language, the details of the woman's life on the island can never be known. A sprinkling of scattered observations by the people who discovered the woman are all that remain — four words of her language, some comments on her material possessions, and a few inferences about her life on San Nicolas. One of the first things she saw when she reached the mainland was a man riding a horse, a sight which amazed and delighted her no end. Perhaps no detail of her story is so indicative of the complete isolation in which this woman had lived for almost two decades.

When found, the "Lost Woman" was living in a small brush enclosure on one of the shell middens. Her meager possessions included a knife made of a rusty piece of a hoop, baskets and wooden containers for food and water, fishing lines, and cords for snaring seals. She was wearing a dress made of bird skins which hung down to her knees.

Unfortunately, the "Lost Woman" died only 7 weeks after she had been "rescued" from San Nicolas. The illness which caused her death was no doubt some disease which had little effect on the whites but proved devastating to one whose race had never had contact with it. The few objects that the "Lost Woman" had made to sustain her life on San Nicolas were scattered, and no trace of them remains. It will always be a source of regret to scientists that the information which the "Lost Woman" could have given about her people died with her.

There remain to us the many objects, thousands of which have already been recovered, which lie buried in the old villages of San Nicolas and which throw much light on the former life of the Nicoleño. Objects which are directly connected with the business of making a living are most common, and it is these which indicate the attractions San Nicolas had for its Indian inhabitants. For the Indian, San Nicolas offered a steady and assured food supply, and this is what permitted the many villages and the relatively large population. Like nearly all of the California Indians, the Nicoleño had no agriculture; their livelihood depended entirely upon the food resources they could hunt and gather. Despite its lack of scenic attractions and its often unpleasant climate, San Nicolas was very favorable to a people with such a hunting-gathering economy. Indeed, by comparison with most

other regions of the West, San Nicolas was a land flowing with milk and honey to its Indian settlers.

The Nicoleño, like the modern Eskimo, must have lived on a diet that was almost exclusively meat. The few plants on San Nicolas could not have provided more than a small portion of the food consumed. In addition, nearly all the food the Nicoleño ate came from the sea, for there are virtually no land animals on San Nicolas (there are only three, to be exact – a lizard, a mouse, and a diminutive fox).

Marine mammals, including seals, sea lions, and sea otters, were a major source of Nicoleño food supply. These were apparently either snared or clubbed, but they do not appear to have been hunted with bows and arrows for arrow points are extremely rare on the island. Among the marine mammals available was *Mirounga,* the elephant seal, which is one of the biggest animals ever hunted by any American Indian people. San Nicolas is one of the favored spots for these huge pinnipeds, the adult males of which reach a weight of 5,000 pounds. Since they are not now molested on San Nicolas, the marine mammals have become extremely tame and are little concerned with the occasional humans who visit their beaches. Elephant seals basking on the beach did not even turn their heads to watch the writer's party walking within ten feet of them. No doubt the sea mammals had reason to be more alert when they were hunted by the Nicoleño.

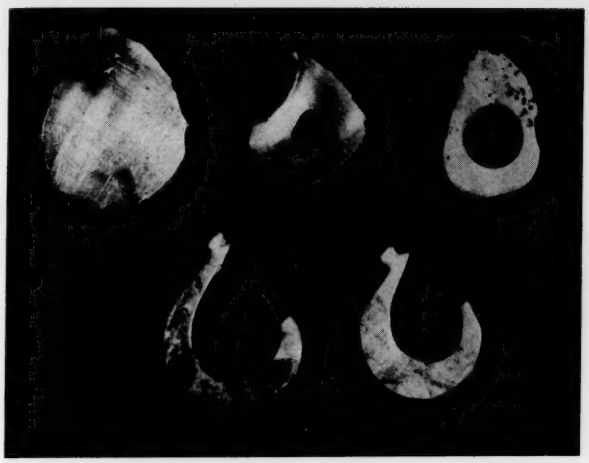
Fishing also provided an important share of the Nicoleño larder. This is seen in the great numbers of fish bones which are found in the middens and is also attested by quantities of aboriginal fish hooks which have been found. The Nicoleño used two kinds of fish hooks; one is simply a straight piece of bone, sharpened on both ends and technically called a gorge – the other type of hook was curved, barbless, and made of pieces of marine shell (usually abalone, although mussel shell and the red top shell were also used). Both kinds of hooks have been proven effective for Pacific fishing by recent experimenters. Unfortunately, no study has been made of the fish bones from San Nicolas to determine which species was the favored catch of the Indians. Jaw bones of the California sheepshead (*Pimelometopon pulchrum*) are common in the shell middens, but there are also many species not yet determined.

Marine birds and migratory waterfowl were also of considerable importance to the San Nicolas Indians. The bones of many birds (also unidentified as to species) are found, and beads, whistles, and bone awls were commonly made from the long bones of birds.

Perhaps their most easily obtained food was derived from the various kinds of shellfish which could be gathered by hand. The rocky shores of San Nicolas afford a favorable environment for many species of shellfish. The sand dunes of the ancient villages are covered with scattered limpets, mussels, and thousands upon thousands of abalone shells. Many other species of shells, and also the remains of sea urchins, occur in lesser numbers. Common artifacts from the village sites are curved pieces of sea mammal ribs which had the same size and function as the tire-irons used by modern man to detach abalone shells from the rocks.

This brief listing of food resources indicates clearly how favorable San Nicolas was for supporting an aboriginal population. But like all other human groups, the Nicoleño were not solely concerned with the food quest. They must have had

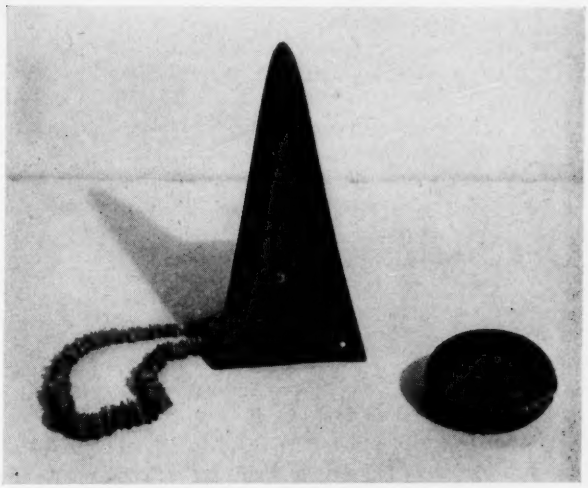
↑ These whale figures of steatite are now in the State Indian Museum, Sacramento, California (reduced).
← Hook-shaped stones believed to represent birds (reduced).
(Photos by Jack R. Dyson, Curator, State Indian Museum)



Steps in making abalone shell fish hooks, and two finished hooks.

music, folk-beliefs, social regulations, and a religion of some sort. Such aspects of life are seldom indicated in material remains, however. These are the things the "Lost Woman" could perhaps have told about, but lacking an eye-witness report our knowledge of the less tangible parts of Nicoleño culture is largely conjectural.

It is known from the objects found at the village sites and with the burials of the dead that the Nicoleño devoted a large amount of time to the production of "art objects" and other things which were not utilitarian but served primarily for esthetic satisfaction. Among the most striking of these specimens are effigies of sea mammals and whales, carved with great care from blocks of soapstone (steatite). Most of the effigies appear to have been found with burials. It is logical to surmise that killer whales and similar striking animals of the sea may have played a large part in Nicoleño religious beliefs, since the Indians' lives were oriented to the sea. Whale bones were commonly used as grave markers and sometimes occur in graves with the deceased. Other non-utilitarian objects which have been found include a great variety of beads and pendants made of shell, bone, and stone. At least 14 different species of shells were used in the production of the shell ornaments, and some sort of mass production technique was no doubt used to make the commoner types of shell beads.



Nicoleño shell beads and stone ornaments in the state Indian Museum, Sacramento (reduced). (Photo by Jack R. Dyson, Curator)

Various objects of steatite, including a canoe, in the State Indian Museum, Sacramento (reduced). (Photo by Jack R. Dyson, Curator).

Although the Nicoleño passed into oblivion without making an impression of any sort on our own historical traditions, archeologists will continue to be interested in reconstructing the life of these little-known people. As further archeological work is carried out, we may expect to learn more about their adaptation to their specialized environment, their industries and manufactures, and perhaps their customs and beliefs. As a passing comment, it may be worth some reflection that the "primitive" aborigines managed to make a living for many people on San Nicolas, whereas our own technological society has managed to get nothing of economic value from the island in the last hundred years. In any case, the study of the Nicoleño has barely begun, and there is no doubt that important finds await the archeologists' shovels.

SPACE TRAVEL—WHY?

ABOUT the middle of 1943, subterranean factories near Nordhausen in the Harz mountains of Germany were scenes of action destined to shake the world. In this Plutonic womb was born the vengeance weapon of Hitler's Germany, the V-2 rocket bomb. Designed as an instrument of destruction, it nevertheless deserves credit as a remarkable engineering achievement, and likely will be regarded by historians as the beginning page of the story of space travel. In terms of the destructive power of modern bombs of the A, H, or C variety, the results obtained against Great Britain with the 600 V-2's actually falling on targets were not appalling. Some 2,500 people were reported killed and another 6,000 injured. If one feels the damage is enough to condemn the V-2 and its perpetrators, he may take comfort from the fact that many of the launchings went awry, and one of the giant rockets actually soared vertically to a height of 100 miles and fell back almost precisely upon the launching site.

It is not in the destructive force, either actual or potential, where lies the earth-shaking importance of the V-2; it is in the idea. The urgency of war gave practical application to an idea, an idea that has long dwelt in the minds of man. Rockets! – rocket propulsion – the one source of driving power that may break man's earthly bonds. Beginnings are already behind us, and while present research is still prompted and supported by military interests, every step made in rocket research is a step nearer to the stars.

Not many years ago space travel was strictly for the pages of science fiction. Today many serious treatises on the mechanics, physiology, mathematics, ballistics, and psychology involved in the problems of extra-terrestrial flight are found in the bindings of even the most conservative of publishers. Investigations into the effect of high accelerations and weightlessness upon living organisms are being made. Much of the information is available to the layman. Several summaries have been published in recent years. One, a 200-page book, well illustrated by plates and drawings, covers the story of rockets from the "fire arrow" of the 13th century to the powerful "viking" rocket of the present. It is titled simply *Space Travel* and is authored by Kenneth W. Gatland and Anthony M. Kunesch.* While it is not intended that this be a review, mention is made here of this volume because of its representative nature, and because of its rich, factual content and readability.

The question posed in the title of this article is the sort that often lies forgotten in the fire and enthusiasm of concerted effort toward a goal that suddenly looms imminently ahead. It is the nature of men to bend prodigious efforts to solving the "how" of a problem, and look for the "why" after it's done. Why does man find the thought of interplanetary flight so intriguing? Why is the thought of exploring the back of the moon so tantalizing? Why does man's curiosity extend to the shrouded surface of the planet Venus, or the frigid plains of Mars? Why? Why does he think in terms of the wildest speculation upon the possibility of other planets revolving about other suns, and the limitless exploration afforded if but some way the gap of century-consuming distances could be bridged? Does the answer lie in the nature of man himself? Is it the natural curiosity, the urge to explore, the impulse to seek adventure? Or could it be a mercenary instinct – if there is such a thing! – that sparks a hope to find new sources of wealth?

The same drive has existed in man from the earliest times. It has caused him to seek new lands, build empires, and populate the world. The barrier of unknown oceans has only prompted man to dare their crossing. The frozen wastes of the arctic have been only a challenge to be met. An unscaled peak, the mystery in the darkness of a newly discovered cave or the abysmal ocean depths, have been forbidding yet compelling features of his world, existing only to be investigated, explored, and conquered. The professed purpose of the great Spanish and English explorers who penetrated the new continents of the Western Hemisphere was a search for fabled gold or the fountain of youth or riches unheard of, but these dreams were but fantastic extensions of the mystery of far places that so intrigued man as to cause him to face hardship and death to seek them.

The Wright brothers and their contemporaries, the pioneers of flight, if asked why they risked life and limb to take their contraptions off the ground would not likely have given an answer that would have been satisfactory to the pragmatist, but even the most visionary of that day could not have seen the vast industry that has grown out of those early experiments. Man has always envied the birds in their freedom of flight, and now he outflies the birds in both distance and speed. The earliest experiments of Marconi, sending and receiving a radio signal at a distance of a few dozen feet, were but the seed of a giant that today reaches his arms around the world and even has touched his thin fingers on the moon. Why did these men do these things? Almost solely for the sake of doing them!

If one must seek excuses for space travel, he may consider the possibility of obtaining access to resources so far untouched. The imagination need not be overstrained to visualize giant mining operations on the moon, where ore-cars so flimsy they would hardly support a payload on earth could be piled high with scarcely any human effort. Gravitational forces are

*See page 30.

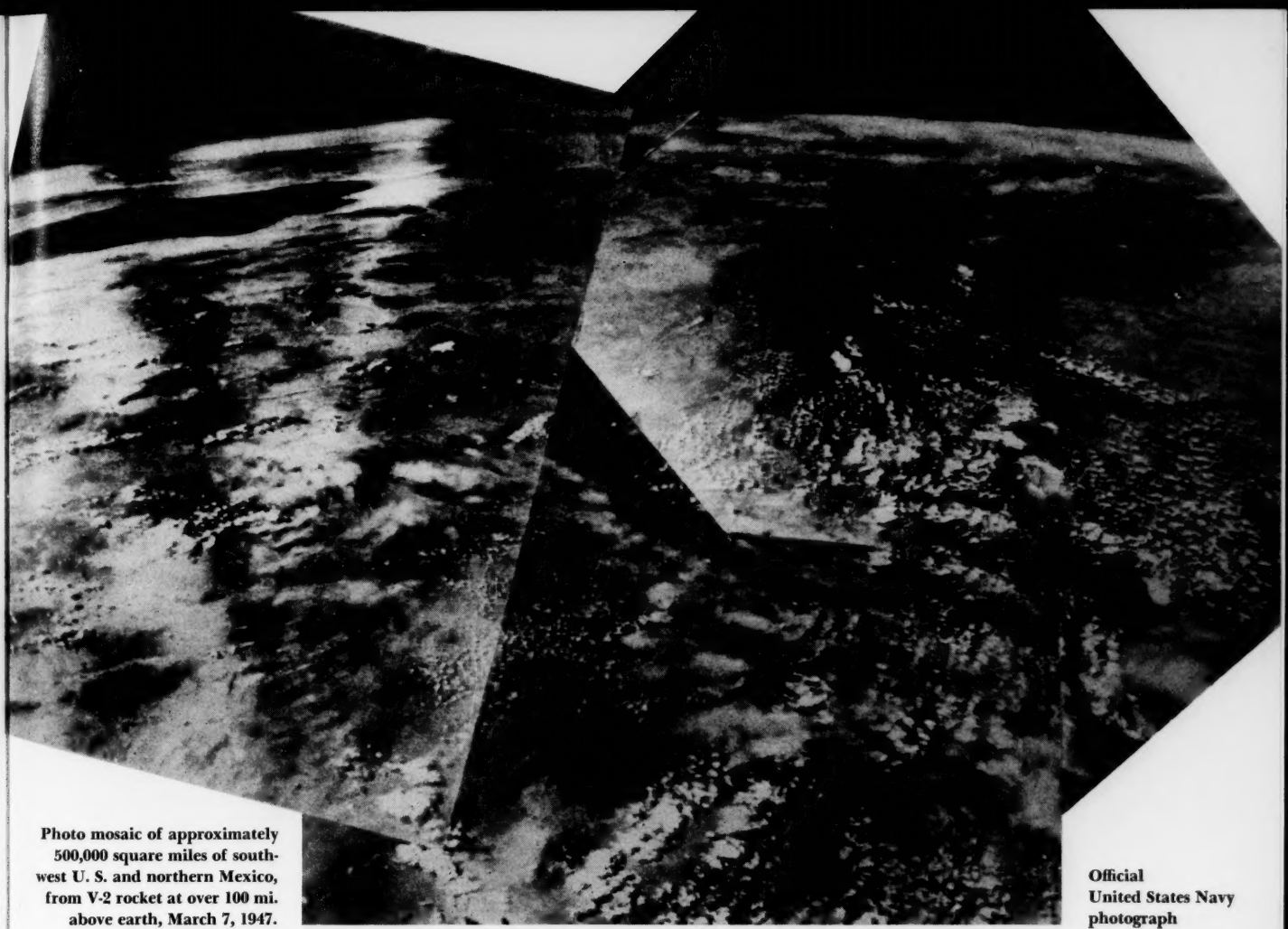


Photo mosaic of approximately 500,000 square miles of southwest U. S. and northern Mexico, from V-2 rocket at over 100 mi. above earth, March 7, 1947.

Official United States Navy photograph

only one sixth as great on the moon as upon the earth. Astronomy would leap forward by a century with the first installation of a telescope on the airless moon. On earth, men must peer at the planets and the stars through a deep sea of atmosphere that not only blurs their view by its turbulence and opacity to light, but completely cuts off ultraviolet and radiation of shorter wavelengths from the sun and stars. A whole new spectrum would unfold for the study of the heavenly bodies.

But none can foresee the results, that would surely be astounding to us today, that will without doubt come from man's ultimate venture into space. The environment with which man will find himself surrounded in the coming age of space flight will change his mode of thinking and his way of life as surely and more completely than did the advent of the industrial revolution. It will add a new dimension to his world He will no longer be a flat-lander confined to move upon the surface of a single planet, but will literally find his wings and gain a freedom he has never known.

Many people today regard the whole idea of space flight with little interest or with outright ridicule. Today, as always, some will insist that attacking such a new and apparently impossible problem is but to turn our backs upon more immediate problems facing civilization. The answer is well stated at the close of the last chapter of Gatland and Kunesch's *Space Travel:*

"These views cannot be supported. One has only to consider what the state of our knowledge of the earth itself would be had our ancestors possessed no ambition to emerge beyond the province of their native islands or continents."

An attitude of satisfaction with things as they are leads immediately to laxity that has brought the collapse of empires.

"If in the present century, we have progressed no farther than to desire comforts and pleasures and an infinite period of peace in which to enjoy them (the commonly accepted ideal of 'civilization') and no longer wish to extend the frontier of human experience and understanding, then we have already taken the pathway to decline." G.W.B.

The space around us

Our Neighbor Worlds. By V. A. Firsoff. Philosophical Library, New York. 1953. 336 pp., 26 illustrations. $6.00.

Are you a "science fiction" fan? Do you believe, or hope, that the planets or even the moon might support life – intelligent life perhaps? Do you wonder if we will find a marker flag of a previous Martian exploring party flying atop one of the mountains of the moon when our first expedition arrives? . . . Or – are you interested in the problems of space navigation, power requirements, and accelerations involved in the design of a rocket to reach moon and planets? . . . Then here is plentiful food for thought, and ammunition for your ray guns.

Mr. Firsoff, whose other listed literary efforts are in the field of earthly travel, tackles a ticklish subject: bold speculation upon means of travel through space, problems to be met and overcome, and physical conditions to be expected when we reach destination moon, Mars, Venus, or Jupiter's earthlike satellites. There is no confusion between fact and speculation, however; the author is careful to distinguish between the two.

The fine difference between FACTS and facts is an elusive thing. In astronomy facts are supposedly based upon observations, but in that field observations are often difficult. The search for oxygen and water vapor in planetary atmospheres is complicated by an overabundance of those gases in our own air. Tiny, obscure bits of evidence may lead to interpretations influenced by the convictions of the observer. All this is carefully pointed out in *Our Neighbor Worlds* – but some of the author's speculations are based upon observations that are questioned by most astronomers.

This is a very readable and enjoyable book, quite popular in style, with careful avoidance of mathematics within the text. A lengthy appendix covers the rather involved mathematics entering into the analysis of atmospheres, mass-acceleration-fuel relationships in a rocket, orbital velocities, etc. Some of the material of the text is of such technical nature that the reader needs some background – in such cases the simplifications introduced are unnecessary.

Chapter II is devoted to theories of the origin of the planets, including one proposed by the author. He suggests a nova-like outburst of the sun with consequent expulsion of shells of gas from the sun which traveled outward with different velocities and eventually fell back to coalesce into the various planets. This chapter is most technical and can be skipped without loss to the main subject of this otherwise not too technical book.

Several of the illustrations are the author's drawings, a little obscure but certainly unique. A few minor errors may be found in the text, unimportant in relation to the book's main subject, but serious to the reader who is concerned with astronomy in general. The speed of revolution of the sun about the center of our Galaxy is stated as 12 miles per second – it is close to 200. The sun is subordinated to the average star by being "rather smaller and less luminous than the average." Recent statistical information indicates there are more stars smaller and fainter than bigger and brighter compared to our sun.

A bibliography follows each chapter, with text references. G.W.B.

Space Travel. By Kenneth W. Gatland and Anthony M. Kunesch. Philosophical Library, New York. 1953. x + 205 pp., profusely illustrated with drawings and photographs. $4.75. For comments, see ASTRONOMY, pp. 28-29.

California offshore

Islands of California: *Their history, romance, and physical characteristics.* By Duncan Gleason. Sea Publications, Inc., Los Angeles. 1950. 104 pp., illustrated with photographs, drawings, paintings, charts. Out of print (?)

Since popular accounts of California islands appear to be scarce, we mention this attractive little book by an artist-author even though inquiries lead to the conclusion that it is out of print. No doubt it is available in other libraries besides the Academy's.

DISCOVERY IN BOOKS

Paths and pathfinders of Pacific exploring

PACIFIC DISCOVERY – *in the source, not the appropriated, meaning – is a tangled web of ship tracks. Ships of Pacific discovery were Polynesian canoes, Peruvian balsas, every type of sail, the most modern warships of great powers. Large or small, power or paddle, they have left their tracks upon the mightiest ocean from Straits of Magellan and Drake Passage to Bering Sea, China Sea, Tasman Sea. Tracks fade with the wake but reappear on charts as soundings, landfalls, winds and currents known. A charted island is a point on one, then many, of the tracks of discovery.*

Nowhere in the world has discovery been so wholly water-borne as in the Pacific. Literature of Pacific discovery is literature of the sea. If from the editor's chair and the reader's fireside we must go down to our sea in books, then salt is the proper flavor of these words. Up anchor, then, with Magellan, Drake, Schouten, Wilkes, and the Starbucks, Folgers, Coffins, and Swains of bluff Nantucket whalers – captains of discovery!

Cape Horn: *The story of the Cape Horn region, including the Straits of Magellan, from the days of the first discoverers, through the glorious age of sail, to the present time, recounting the exploits of Magellan, Drake, Schouten, Fitzroy, Darwin, Melville, and many others, including the author's own experiences; wherein many new facts are brought to light, an important geographical discovery is made, and several great heroes of the sea, foremost of them John Davis, are for the first time given their due.* By Felix Riesenberg. Dodd, Mead & Company, New York. 1951. xv + 452 pp., illustrated with charts and photographs. $5.00.

Balboa saw the great South Sea in 1513. Just six years later Magellan stood into the southern Atlantic with the certain purpose of finding an opening far southward in the apparently unending wall of the Americas – a seaway into the Pacific and off west to the Spice Islands. Man's "greatest voyage" was not, so Felix Riesenberg says, the ill-found venture many have called it. Master Mariner in Sail and Steam, master craftsman with words, the author of *Cape Horn* here gives this reader, at least, for the first

time a seaman's canny estimate of Magellan's achievement. "Never before, and seldom in the Age of Discovery, was an expedition so ably prepared; nor have such valuable records of any other voyage been left." Captain Riesenberg's expert appraisal of lines, tons burden, displacement, rigging, and fitting out were a revelation to us. People didn't just drift off into the unknown in leaky tubs with scant provisions and not the slightest idea what they were up against. One simple sentence is the key to the worth of this book: "Let us look at the ships of Magellan through the eyes of a sailor." Without condescension toward lubberly readers, or any manner of professional toploftiness, Riesenberg makes clear to us the *how* as well as the where and why of the sometimes quite incredible voyages. Men planned, calculated, estimated the situation, then as now; only the unknowns were so very far greater — time-distance, wind, weather, lands and peoples. Even so, failure came as much through human weakness — greed, jealousy, treachery — as from headwinds, calms, rock-studded lee shores, savages, or wormy bottoms and biscuits.

This is a book of ships, and of their tracks of discovery through the world's hardest passage for sail and steam. It is also a drama of men, the men who drove ships and themselves around the Horn and through the Straits, and the stone-age men Europeans found living on the land between the devil and the deep, Tierra del Fuego. A successful master of sail, especially, had to know men. Captain Riesenberg appears to us to look understandingly into the hearts and minds of his fellow Cape Horners, whose human characteristics had so much to do with their success or failure in this ultimate test of seamanship and leadership.

The courage, probity, skill, and vanity of Drake, who discovered an island now sunk in the Pacific; the zeal and resoluteness in duty of Sarmiento, who became a symbol of ill luck; the sturdy Dutch competence of Schouten, "most probably the first of the human race to sail a ship [the *Eendracht*] across the lower land of America through an open sea" — such are the human qualities that make the *Cape Horn* story a great drama in its sweep through four centuries. Nowhere else on earth were men called to such stubborn battle with the elements for the mere right to pass. Imagine, if you can, natural forces capable of turning back a William Bligh! The symbol — deservedly or not — of a hard man, Bligh had the stubbornness to bring mutiny upon him, and the sheer driving guts to captain a small-boat crew of sick and starving men across half the Pacific afterwards. Yet such was his respect for it that he obtained authority in his *Bounty* orders to proceed to the South Sea by way of Good Hope if he couldn't make the Horn. And so it was. "Having sighted the Horn, Bligh could not double it. He held on during a month of bitter hammering, an ordeal harder on himself than on the others. . . . Strict in holding to his duty, he charged against the seas [from March 24] until April 22, 1788. For twenty-nine days of the southern winter, they beat hopelessly to windward. Ordering the helm aweather, Captain Bligh ran off, squared yards, and scudded to the Atlantic, running his easting down to Table Bay. William Bligh never ceased to regret, even when he flew the broad pennant of Vice Admiral, that he had given in to Cape Horn." Men like Bligh didn't "run off" from any ordinary force on or of this earth.

Because of Darwin's fame, the voyage of H.M.S. *Beagle* with Captain Fitzroy, and the sojourn of the Fuegian natives in England, make a story well enough known in outline. Riesenberg has filled in the rich fabric of detail of the episode of Fuegia Basket, Jemmy Button, York Minster, and the short-lived Boat Memory. He has done this in warm understanding of these gentle, maligned primitives that civilization so savagely wiped out. Those four that the well-meaning Fitzroy took to London and attempted to "civilize" in the Victorian manner become symbolic in Riesenberg's well founded indignation over the fate of their people, who showed savagery only under duress. In 1834 the Yahgan, one Fuegian tribe, numbered 3,000; in 1924, 50. In 1925 there was an epidemic of measles. . . .

The clippers came and went, then the grain and nitrate ships — bulk carriers of great tonnage and speed. All are gone now, in fact virtually all shipping is gone from the Horn. A grim and roaring climax to *Cape Horn* took place at Coronel where, on November 1, 1914, Admiral von Spee with the armored cruisers *Scharnhorst* and *Gneisenau* blasted two British cruisers and Admiral Cradock to the bottom; and at the Falklands, five weeks later, when the Allied defeat was decisively avenged — with the German raiders decisively sunk in turn by Admiral Sturdee's battle-cruiser squadron.

Cape Horn first appeared in 1939, hence is doubtless an old favorite on many bookshelves. We are glad that the recent new printing has enabled us to enter it in our random log of Pacific discovery. We have a better grasp of our own central theme after seeing those ships, those waters, and those men "through the eyes of a sailor."

The Sea Hunters: *The New England whalemen during two centuries, 1635-1835.* By Edouard A. Stackpole. J. B. Lippincott Company, Philadelphia and New York. 1953. 510 pp., 16 illus. from old maps and prints. $7.50.

One of the most significant and fruitful phases of Pacific discovery, which began in 1789 and extended to the mid-19th century, had its beginnings partly—and curiously—along the New England coast nearly two centuries earlier. New England whaling may be said to have begun in the early 1600's; by 1688 a royal commissioner was reporting that " 'New Plymouth Colony have great profit by whale killing' "; and two years later the Nantucket Islanders had a Cape Cod whale catcher residing among them as instructor. In those days whales were beached — it was an alongshore business. Then came a "gradual but steady (transition) from shore whaling to organized sea voyages," which "became profitable particularly to the little colony of Englishmen on the Island of Nantucket, for here the embryo whalemen were geographically situated as if on a mothership in the Atlantic."

Once they had tasted deep water, it did not take them long to range the Atlantic to Africa's Guinea coast. As the first navigators to recognize and use the mysterious Gulf Stream — this led to a scientific article by Benjamin Franklin — "they had now become America's first oceanographers." So it was that in 1789, just 100 years after whaling came to Nantucket, two Nantucketers, Captain Shields and First Mate Hammond, took the first whaler around the Horn into the Pacific, True, the *Emelia* was owned by Enderby & Sons of London, but so far in the lead already were Nantucketers among the world's whaling men, that it was hard indeed to find a British whaler not officered by one or more of them, with some Nantucket hands and harpooners.

Mr. Stackpole's chapters on the exceedingly involved political and economic affairs of whaling during the critical days of the Revolution and of the War of 1812 make fascinating and revelatory reading. Staunch Quakers, Nantucketers first, last and always, but with ties to America and markets mainly in England, the whalemen were hard put to stay afloat and free in those days. Here is an absorbing phase of American history barely touched in the history books. But since we are here on Pacific discovery bent, let us see what followed the *Emelia* into the South Sea.

An era of more intensive Pacific exploration followed, as whalers and sealers rounded the Horn in increasing numbers. In their persistent search for new whaling grounds and undiscovered seal rookeries, they became true explorers and began to fill vacancies on the charts with their discoveries, dotting them with islands, reefs, and shoals. Lieutenant Charles Wilkes reported to the nation in 1845, that "our whaling fleet may be said . . . to whiten the Pacific with its canvas" (*Narrative of the United States Exploring Expedition*).

Wilkes and the French Admiral Dumont D'Urville (in January 1840), and the American sealing master, Palmer (in November 1820), have each been champion ed as true discoverer of the Antarctic continent. Mr. Stackpole introduces his claimant, whose logbook of the schooner *Hunter* our present author found on Nantucket: ". . . a new claim is advanced here; namely that Christopher Burdick, captain of the *Huntress,* was among the first to recognize the continent of Antarctica as continental mainland." Burdick's critical entry is of February 15, 1821, but Mr. Stackpole is convinced by Palmer's own log that his November 17, 1820 sighting was of "the precipitous shores of islands," not the continent. "*Among* the first" is wise qualification, however.

What matters is that during this fast moving period Antarctica *was* discovered, the limits of the Pacific were set, and exploring American whaler-sealers out of New England and New York played a major part.

Adventure at its highest quickens these pages — the pioneering voyage of the *Asia and Alliance* out of Nantucket to remote Kerguelen in the Indian Ocean; the sinking of the *Essex* by a sperm whale and its terrible aftermath (a horror story of the darkest dye); Captain Mayhew Folger's accidental discovery of the *Bounty* mutineers' hideout on Pitcairn Island. The book is replete with dramatic happenings.

Faultfinding is not our pleasure, but the rather too many typographical and editorial slips even for so long a book become snags now and then. For this reviewer a chapter analyzing the decline of whaling — which came first, gaslight and coal oil, or the decline of whales from too much whaling? — and its modern revival, would have been both interesting and instructive. (an appendix would have sufficed). Otherwise, we have nothing but praise for this scholarly yet excitingly readable account of the "golden age" of whaling.

The Hidden Coasts: *A Biography of Admiral Charles Wilkes.* By Daniel Henderson. William Sloane Associates, New York. 1953. 306 pp., portrait, endpaper map. $5.00.

Cape Horn brought us close to Antarctica. *The Sea-Hunters* had us on those icy shores with the sealers, and introduced us through "the extraordinary figure of Jeremiah N. Reynolds" to the growing clamor for Federal protection of Americans' mounting interests in the Pacific. Nantucket and New Bedford petitioned for "a Naval Expedition . . . for the purpose of exploring such portions of the North and South Pacific oceans" as presented the greatest hazards to whalemen. Reynolds it was who finally got action under way in Washington that ultimately led to Lieutenant Charles Wilkes' historic role as commandant of the United States Exploring Expedition of 1838-41.

This may or may not be the definitive Wilkes biography; at present, it seems to be the only full-length one. The gap in the literature came to Henderson's notice by chance. The author of *Yankee Ships in China Seas* and other books was just the experienced researcher and biographer to tackle it himself. A much longer book could doubtless have resulted from the material unearthed. Relative brevity will gain more readers, however, and the extensive bibliography will serve persevering students. The author mentions, incidentally, that Wilkes' autobiography is now in preparation for print, from the holograph in the Library of Congress.

Mr. Henderson holds that Admiral Charles Wilkes is a forgotten American hero who deserves even yet the full recognition he never won in his life of patriotic service. In any case, he is rich material for a biography and Mr. Henderson has done the job well, which means honest recognition of his hero's outstanding faults as well as his towering virtues. Always a stormy petrel under the limelight, Wilkes is recalled to the history-minded as the "hero" of the Civil War's "Trent Affair," but the brilliant command of the Exploring Expedition was enough to place him securely in history, Antarctica or no.

Although the chapters on the Expedition, alone, would satisfy our interests in Pacific discovery, the whole picture of the man is necessary to the full appreciation of Wilkes' achievement in Antarctic and Pacific exploration. And the account of the Expedition's nearly abortive beginnings provides some wry reflection on democratic processes, while leaving us with the conviction that the unregimentable individualism of its Wilkeses is democracy's greatest asset and clearest proof.

Explorers of the Pacific: *European and American Discoveries in Polynesia.* By Te Rangi Hiroa (Peter H. Buck). Bernice P. Bishop Museum Special Publication 43, Honolulu. 1953. viii + 125 pp., illustrated. Paper, $1.75.

The late Director of the Bishop Museum, Dr. Buck, left the completed manuscript for this useful summary of all the principal voyages of Pacific discovery, to and including that of Wilkes. Members of the Museum staff have conscientiously prepared the MS for printing and publishing. The illustrations from original sources are well-reproduced. There is an extensive bibliography of primary sources. Completely matter-of-fact in style, this slim book lacks the color of, say, J. C. Beaglehole's *Exploration of the Pacific* (1934) but that work ends wih Cook. Dr. Buck has included a goodly number of explorers unknown to the general reader, but has little to say of the American whalers that Stackpole found so productive of discoveries. The chief value of *Explorers of the Pacific* is perhaps that it gives concisely and authoritatively the essential data in reference form for more different voyages than any other single book we know.

(Dr. Buck's book may be obtained from the Academy if you do not find it in the bookstores.) D.G.K.

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by

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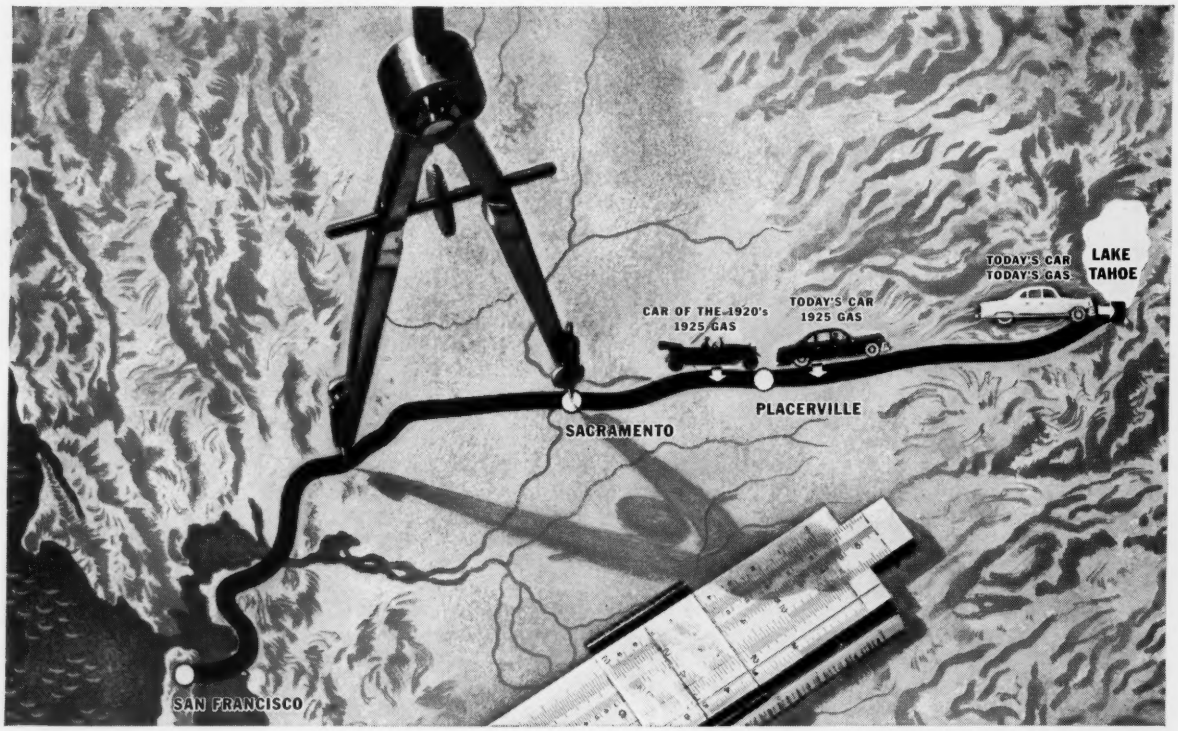

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